



DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS-R2-ES-2021-0098; FF09E21000 FXES1111090FEDR 234]

RIN 1018–BF25

Endangered and Threatened Wildlife and Plants; Threatened Species Status with Section 4(d) Rule for Cactus Ferruginous Pygmy-owl

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), determine threatened species status under the Endangered Species Act of 1973 (Act), as amended, for the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*), a bird subspecies found in Mexico, southern Arizona, and southern Texas. This rule adds the subspecies to the List of Endangered and Threatened Wildlife. We also finalize a rule under the authority of section 4(d) of the Act that provides measures that are necessary and advisable to provide for the conservation of this subspecies. We concluded that designation of critical habitat is prudent and determinable at this time. Critical habitat will be proposed in a separate rule-making.

DATES: This rule is effective [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: This final rule is available on the internet at <https://www.regulations.gov>.

Comments and materials we received, as well as supporting documentation we used in preparing this rule, are available for public inspection at <https://www.regulations.gov> at Docket No. FWS-R2-ES-2021-0098.

FOR FURTHER INFORMATION CONTACT: Heather Whitlaw, Field Supervisor,

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SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act, a species, subspecies, or distinct vertebrate population segment warrants listing if it meets the definition of an endangered species (in danger of extinction throughout all or a significant portion of its range) or a threatened species (likely to become endangered within the foreseeable future throughout all or a significant portion of its range). If we determine that a species warrants listing, we must list the species promptly and designate the species' critical habitat to the maximum extent prudent and determinable. We have determined that the cactus ferruginous pygmy-owl meets the definition of a threatened subspecies; therefore, we are listing it as such. We have determined that the designation of critical habitat for the cactus ferruginous pygmy-owl is prudent and determinable, and we will propose designation in a separate rule. Listing a species as an endangered or threatened species can be completed only by issuing a rule through the Administrative Procedure Act rulemaking process (5 U.S.C. 551 et seq.).

What this document does. This rule lists the cactus ferruginous pygmy-owl as a threatened subspecies under the Act and adds it to the List of Endangered and Threatened Wildlife. This rule also finalizes a rule issued under section 4(d) of the Act (hereafter, referred to as a "4(d) rule").

The basis for our action. Under the Act, we may determine that a species is an

endangered or threatened species because of any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We have determined that threats to the cactus ferruginous pygmy-owl include: (1) Habitat loss and fragmentation from urbanization, invasive species, and agricultural or forest production; and (2) climate change (effects from current and future changes in climate) and climate conditions (effects from current and past climate), resulting in hotter, more arid conditions throughout much of the subspecies' geographic range. The 4(d) rule would generally prohibit the same activities as prohibited for an endangered species but would allow exemptions for specific types of education and outreach activities already permitted under a Migratory Bird Treaty Act permit, surveying and monitoring conducted in Arizona under a state scientific activity permit issued by the state, and habitat restoration and enhancement activities that improve habitat conditions for the cactus ferruginous pygmy-owl.

Section 4(a)(3) of the Act requires the Secretary of the Interior (Secretary) to designate critical habitat concurrent with listing to the maximum extent prudent and determinable. Section 3(5)(A) of the Act defines critical habitat as (i) the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protections; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary that such areas are essential for the conservation of the species. Section 4(b)(2) of the Act states that the Secretary must make the designation on the basis of the best scientific data available and after taking into consideration the

economic impact, the impact on national security, and any other relevant impacts of specifying any particular area as critical habitat. As stated in the proposed listing rule (86 FR 72547, December 22, 2021), we have determined that the designation of critical habitat for the cactus ferruginous pygmy-owl is prudent and will be proposed in a separate rule.

Previous Federal Actions

As described in **Previous Federal Actions** of our proposed listing rule for the cactus ferruginous pygmy-owl (86 FR 72547, December 22, 2021), we received a petition dated March 15, 2007, from the Center for Biological Diversity and Defenders of Wildlife (CBD, DOW; petitioners) requesting that we list the cactus ferruginous pygmy-owl as an endangered or threatened species under the Act (CBD and DOW 2007, entire). On October 5, 2011, we published in the *Federal Register* (76 FR 61856) a 12-month finding on the petition to list the pygmy-owl as endangered or threatened. Using the currently accepted taxonomic classification of the pygmy-owl (*Glaucidium brasilianum cactorum*), we found that listing the pygmy-owl was not warranted throughout all or a significant portion of its range, including the petitioned and other potential distinct population segment (DPS) configurations. We were litigated on this decision (Case 4:12-cv-00627-CKJ), and the court found in favor of the plaintiffs and remanded the 2011 12-month finding on the 2007 petition to list the pygmy-owl (Case 4:14-cv-02506-RM). Under a court settlement, we developed a new 12-month finding and published our proposed rule to list the pygmy-owl on December 22, 2021 (86 FR 72547).

Peer Review

A species status assessment (SSA) team prepared an SSA report for the cactus ferruginous pygmy-owl. The SSA team was composed of Service biologists, in consultation with other species and subject-matter experts. The SSA report represents a compilation of the best scientific and commercial data available concerning the status of

the subspecies, including the impacts of past, present, and future factors (both negative and beneficial) affecting the subspecies.

In accordance with our joint policy on peer review published in the *Federal Register* on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we solicited independent scientific review of the information contained in the SSA report. As discussed in the proposed rule, we sent the SSA report to five independent peer reviewers and received three responses. The peer reviews can be found at <https://regulations.gov>. We also sent the SSA report to 13 partners, including Tribes and scientists with expertise in land management, pygmy-owl and raptor ecology, and climate science, for review. We received review from 11 partners, including State and Federal agencies, universities, and nonprofit organizations. In preparing the proposed rule, we incorporated the results of these reviews, as appropriate, into the SSA report, which was the foundation for the proposed rule and this final rule.

Summary of Changes from the Proposed Rule

Since the publication of the December 22, 2021, proposed rule to list the cactus ferruginous pygmy-owl as threatened with a 4(d) rule (86 FR 72547), we have made the following changes:

(1) Per requests from commenters, we have revised the provisions of the 4(d) rule. We updated and clarified our description of the habitat restoration and enhancement exception to clarify that this exception does not include vegetation management along roadways or fuels management that includes the removal of trees and large shrubs. We also provided additional clarity and guidance on what types of projects would be excepted under the 4(d) rule and which would require coordination with and approval from the Service. These changes included additional clarification regarding conditions under which prescribed fire may be excepted under the 4(d) rule and specific guidance on

how to coordinate with us prior to habitat restoration and enhancement projects to ensure that projects qualify for exception under the 4(d) rule.

(2) In the preamble, we now include a more detailed discussion of the DPS analysis we undertook, including a description of any pertinent new information we have received since our 2011 12-month finding (76 FR 61856, October 5, 2011).

(3) Based upon new reports we received from the Arizona Game and Fish Department during the comment period, we updated the biological information for the subspecies related to surveys, distribution, occupancy, and genetic differentiation (AGFD 2021b, pers. comm.; Cobbold et al. 2021, entire; Cobbold et al. 2022a, entire; Cobbold et al. 2022b, entire). This information did not alter any significant findings in the proposed rule.

(4) A number of commenters provided us with additional references to consider as we finalized this rule. We considered these references and other references we found while responding to public comments and have incorporated them and any associated information in the final rule and SSA report as appropriate. See the **Summary of New Information Since the 2011 12-Month Finding** section below for an explanation of where these new references are included in issues relevant to our finding and determination.

(5) We added a summary of the new information and changes that have occurred since our 2011 12-month finding to clarify the factors that contributed to a different determination in this final listing rule. This summary is found in **Summary of New Information Since the 2011 12-Month Finding**, below.

(6) In response to a comment received during the public comment period, we completed additional analysis on the effects of certain land uses in Texas and Arizona over the past decade (2010–2020) on pygmy-owl habitat using additional sources of

information to the source used by the commenter. This further analysis can be found in appendix 6 of the SSA report (Service 2022a, appendix 6).

Summary of New Information Since the 2011 12-Month Finding

This final listing rule results in a different finding than our 2011 12-month finding. This change in finding is based on an additional decade of threats and land-use changes, as well as climate change, acting on the landscape within the range of the pygmy-owl. We also used a different approach in assessing the status of the pygmy-owl throughout its range. We developed a species status assessment for the pygmy-owl using the best available information and a team of experts, including subject-matter experts, representing a range of agencies, Tribal entities, and conservation partners, supported by new spatial data and modeling developed subsequent to our 2011 12-month finding (76 FR 61856, October 5, 2011). Below we summarize the new information available since 2011 upon which our 2021 proposed listing rule (86 FR 72547, December 22, 2021) was based. We have also updated our discussion of the DPS finding to include information subsequent to our 2011 12-month finding (see *Distinct Vertebrate Population Segment*, below).

Taxonomic Classification

Additional genetic sampling was conducted in Mexico by the Arizona Game and Fish Department (AGFD) (Cobbold et al. 2022b, entire). While these additional data add to the baseline information we used to evaluate the status of the pygmy-owl, these results did not change our finding that we lack sufficient information to adopt the proposed taxonomic classification (change taxonomic classification to *Glaucidium ridgwayi cactorum* with associated change in distribution) described by Proudfoot et al. (2006a, entire; 2006b, entire) and discussed in the 2011 12-month finding (76 FR 61856, October 5, 2011). Therefore, no change to the taxonomic classification of the pygmy-owl has occurred since our 2011 12-month finding.

Rangewide Distribution

The taxonomic classification of the pygmy-owl did not change; thus, the general geographic distribution of the pygmy-owl did not change and is the same as described in the 2011 12-month finding (76 FR 61856, October 5, 2011). However, the analysis in our current finding divided the overall range of the pygmy-owl into five separate analysis units. Using this smaller scale analysis, we were able to discuss the condition of pygmy-owl populations and their habitat within each analysis unit, which is a finer resolution analysis than we used in 2011. This more detailed analysis can be found in the SSA report (Service 2022a, entire), which includes a detailed description of each analysis unit. We also accessed additional pygmy-owl locations across the range of the pygmy-owl that we did not use in 2011 via the Global Biodiversity Information Facility, which included location data from such sources as eBird, iNaturalist, and museum specimens (GBIF 2020, unpaginated).

Climate Change

The decade that passed between our 2011 12-month finding (76 FR 61856, October 5, 2011) and our proposed listing rule (86 FR 72547, December 22, 2021) has been characterized by ongoing climate impacts to pygmy-owl populations and their habitats (Bagne and Finch 2012, entire; Coe et al. 2012, entire; Jiang and Yang 2012, entire; Romero-Lankao, et al. 2014, p. 1443; Melillo et al. 2014, entire; USGCRP 2018, chapters 23 and 25). Impacts resulting from climate change such as ongoing drought (habitat and prey impacts), increased temperatures (decreased productivity), reduced vegetation health and associated impacts to pygmy-owl prey availability, and increased fire occurrence (habitat and prey impacts) have resulted in negative effects to pygmy-owl abundance and distribution, as well as in loss of habitat and increased habitat fragmentation (Melillo et al. 2014, entire; Vermote et al. 2014, unpaginated; Cook et al. 2015, p. 6; Easterling et al. 2017, pp. 207–230; USGCRP 2018, chapters 23 and 25;

Gonzalez et al. 2018, entire; Breshears et al. 2018, p. 1; Williams et al. 2020, p. 317, IPCC 2022, entire).

Enough time has passed since the early predictions of impacts of climate change that we have seen evidence of those predicted impacts on vegetation communities across the range of the pygmy-owl. Generally, these impacts have been in line with or worse than what was predicted. New climate models and projections and updated information in general were available for our analysis. These projections continue to predict impacts at the same or increasing levels upon the landscape in areas where the pygmy-owl occurs. This information is discussed in greater detail in *Climate Change and Climate Conditions*, below. Additionally, we included climate scientists in our peer and partner review of the climate section of the pygmy-owl SSA report, and they provided input and updated citations regarding our discussion of climate effects that are included in the SSA report and this final listing rule.

Rangewide Habitat Loss

With the exception of climate change, there is not a single threat leading to habitat loss across the range of the pygmy-owl. However, habitat loss is occurring across every portion of the range of the pygmy-owl. Each of the five analysis units is experiencing varying degrees of pygmy-owl habitat loss that, when considered together, result in rangewide habitat loss (Thomas et al. 2012, p. 43; Lyons et al. 2013, p. 8; Vo 2013, unpaginated; TDC 2019, entire; Texas Land Trends 2019, entire; Wied et al. 2020, entire; Mesa-Sierra et al. 2022, unpaginated; Burquez 2022, pers. comm.). The 2011 12-month finding did not assess local habitat impacts at the level of individual analysis units. These more specific descriptions of threats and impacts by analysis unit can be found in the SSA report (Service 2022a, appendix 5) and in *Summary of Current Condition of the Subspecies*, below.

Status in Arizona

As in 2011, pygmy-owls continue to be absent from Pinal County and around Tucson where they were found as recently as the early 2000s (Ingraldi 2020, pers. comm.). Additionally, based on survey efforts in 2020 and 2021, pygmy-owls can no longer be found reliably in Organ Pipe Cactus National Monument for the first time since records have been kept (Ingraldi 2020, pers. comm.; AGFD 2021b, pers. comm.). Personal communication with Tribal staff indicates that pygmy-owls continue to be found on the Tohono O’odham Nation, although comprehensive surveys have not been conducted and information on specific locations of pygmy-owls is not released by the Tohono O’odham Nation (Verwys 2020 and 2021, pers. comm.). Currently, the known abundance of owls is higher in Altar Valley than it was in 2011, likely due to increased survey and monitoring under the Pima County Multi-Species Conservation Plan and by the AGFD (Flesch 2018a, entire; Ingraldi 2020, pers. comm.; PCOSC 2021, entire). However, occupancy in the Altar Valley appears to be down in 2022, potentially in response to the dry winter of 2021–2022 and ongoing drought conditions (AGFD 2022, unpublished data; Service 2022b, unpublished data; NDMC 2022, unpaginated).

Threats related to climate change have increased, including fire (Inciweb 2022, unpaginated), invasive species, degraded vegetation condition, and reduced prey availability due to drought and impacted hydrology including the loss of surface and ground water (BOR 2021, entire; NDMC 2022, unpaginated). Development continues to impact habitat particularly in areas of northwest Tucson and Pinal County. While there is not a direct correlation between acres of pygmy-owl habitat lost and human population growth, it is reasonable to find that, as human population grows, the amount of native habitat lost or fragmented will increase. We looked at recent population growth and projections in Arizona as an indication for future urbanization (OEO 2018, unpaginated; U.S. Census Bureau 2021a, unpaginated; EBRC 2021, unpaginated). New, taller border walls have been constructed along all border areas occupied by pygmy-owls in Arizona

(DHS 2020, unpaginated). As discussed in the SSA report, the impacts of this border infrastructure on pygmy-owls have not been studied but represent a potential barrier to pygmy-owl movements along and across the border.

We considered a new analysis of Arizona pygmy-owl occupancy (Flesch et al. 2017, entire). This report includes an analysis of factors contributing to pygmy-owl occupancy in Arizona, as well as factors to consider in designing and implementing pygmy-owl conservation actions. In addition, a climate change study that was published since our 2011 12-month finding predicts a reduction in saguaros (*Carnegiea gigantea*) in the Sonoran Desert (Thomas et al. 2012, p. 43). Saguaro are the key nesting substrate for pygmy-owls in the Sonoran Desert of Arizona.

Status in Texas

Threats to the pygmy-owl and pygmy-owl habitat from drought, as well as fire, freezes, and hurricanes (Harvey in 2017, Hanna in 2020, and Ida in 2021) have all continued in Texas over the past decade (EPA 2016, unpaginated; Bhatia et al. 2019, entire; Inciweb 2022, unpaginated; Bond 2022, unpaginated; NDMC 2022, unpaginated; NIFC 2022, unpaginated; NWS 2022, unpaginated). Many of these effects are the result of climate change (Romero-Lankao, et al. 2014, p. 1459; EPA 2016, unpaginated; Gonzalez et al. 2018, entire). Urbanization and agricultural development in both Texas and northeastern Mexico (Texas Land Trends 2019, entire; USGS 2022, unpaginated; Texas Comptroller 2020, unpaginated) have continued, likely resulting in increased isolation of the Texas population from those in Mexico. No recent surveying or monitoring has been conducted in Texas. However, given current habitat conditions as outlined in the SSA report, the declines in pygmy-owls and pygmy-owl habitat documented in the 2011 12-month finding have likely continued, resulting in reduced abundance of pygmy-owls. For example, the Texas Parks and Wildlife Department recently changed the conservation status rank for ferruginous pygmy-owl in Texas from

S3:vulnerable to S2:imperiled (TPWD 2022, unpaginated). In addition, the number and distribution of pygmy-owls in the Lower Rio Grande Valley has declined since 1988, likely due to the ongoing loss of riparian habitats along the Rio Grande (Leslie 2016, entire).

Status in Northern Sonora

Our understanding of the habitat needs for pygmy-owls in the Sonoran Desert has improved since 2011 as a result of ongoing research in northern Sonora (Flesch 2014, entire; Flesch et al. 2015, entire; Flesch 2017, entire; Flesch et al. 2017, entire; Cobbold et al. 2021, entire; Cobbold et al 2022a, entire). The abundance of pygmy-owls in northern Sonora has declined with increasing drought (Flesch et al. 2017, entire; Flesch 2021, entire). Abundance and densities of pygmy-owls are, in general, higher farther south in Sonora in thornscrub and tropical dry forests and lower in the northern part of northwest Mexico (Cobbold et al. 2021, entire; Cobbold et al. 2022a, entire). These data are consistent with previous findings (Flesch 2003, entire). Threats resulting in reduced vegetation condition and increased habitat fragmentation have been documented (Flesch 2014, entire; Flesch et al. 2015, entire; Flesch et al. 2017, entire; Flesch 2021, entire). In 2012, a climate change study was published predicting a reduction in saguaros in the Sonoran Desert (Thomas et al. 2012, p. 43). Saguaros are the key nesting substrate for pygmy-owls in the Sonoran Desert of northern Sonora. In addition, a retired Service biologist who led the Sonoran Joint Venture provided updated information on the status of land use and impacts to pygmy-owls in Sonora (Mesta 2020, pers. comm.).

Status in Remainder of Mexico

There are no recent pygmy-owl survey or monitoring data for the remainder of Mexico, so we continue to have no recent, verified data on abundance or occupancy. We used eBird, iNaturalist, and museum specimen records to get a general scope of occurrences in these areas, but did not use these records to estimate abundance (GBIF

2020, unpaginated; Johnston et al. 2021, p. 1266). Ten additional years of threats acting on these population groups have impacted the landscape and habitat of the pygmy-owl in these areas including extraction of natural resources, increases in invasive species, use of pesticides, and the effects of climate change such as drought and increased evapotranspiration (Enríquez and Vazquez-Perez 2017, p. 546, DataMexico 2021, unpaginated; Murray-Tortarolo 2021; entire; Mesa-Sierra et al. 2022, unpaginated). Specifically, habitat loss and fragmentation has increased since 2011 as a result of wood harvesting, agriculture, population growth and urbanization, and other land uses (CONAPO 2014, p. 25; Enríquez and Vazquez-Perez 2017, p. 546; DataMexico 2021, unpaginated; Burquez 2022, pers. comm.). Increases in hurricanes in northeastern Mexico (EPA 2016, entire) have resulted in impacts to pygmy-owl habitat. We also received additional information related to the status of the pygmy-owl in Mexico such as the lack of research and data, lack of land use planning and government oversight, other threats, establishment of preserve areas, and cultural significance (Enríquez and Vazquez-Perez 2017, p. 546; Enríquez 2021, pers. comm.).

Conservation Actions

Implementation of the Pima County Multi-Species Conservation Plan has resulted in additional surveys for pygmy-owls on lands controlled by Pima County in Arizona. Additional pygmy-owl habitat has been protected through conservation planning and habitat acquisition and protection as part of implementing this large, regional Pima County Habitat Conservation Plan (Pima County 2016, entire; Flesch 2018a, entire; PCOSC 2021, entire). Investigation of captive-breeding and release to establish new pygmy-owl population groups and to augment existing population groups has continued in Arizona (AGFD 2015, entire). The Altar Valley Watershed Plan has been developed and will contribute to the enhancement of pygmy-owl habitat in Altar Valley, Arizona (Altar Valley Watershed Working Group 2022, entire).

Factor A—The present or threatened destruction, modification, or curtailment of its habitat or range

We evaluated new information related to the effects of present and future climate change on vegetation on which the pygmy-owl depends (Bagne and Finch 2012, entire; Coe et al. 2012, entire; Jiang and Yang 2012, entire; Flesch 2014, pp. 113–116; Melillo et al. 2014, entire; Romero-Lankao, et al. 2014, p. 1443; Flesch et al. 2015, entire; Pearce-Higgins et al. 2015, entire; Deguines et al. 2017, entire; Flesch et al. 2017, entire; USGCRP 2018, chapters 23 and 25). The incidence of fires, particularly in Arizona and Texas, has increased since 2011 (Inciweb 2022, unpaginated). While there is not a direct correlation between acres of pygmy-owl habitat lost and human population growth, it is reasonable to find that, as human population grows, the amount of native habitat lost or fragmented will increase. We used updated population growth estimates in the SSA report and this final rule (Brinkhoff 2016, unpaginated; HHS 2017, unpaginated; OEO 2018, unpaginated; INEGI 2021, unpaginated; CONAPO 2014, p. 25; TDC 2019, entire; Pinal County 2019, p. 126; Gonzales 2020, unpaginated; DataMexico 2021, unpaginated; Service 2022a, chapter 7). We also looked at more recent information from Mexico related to habitat loss and fragmentation, which showed that land uses continue to impact pygmy-owl habitat and the occupancy and productivity of pygmy-owls (Enríquez and Vazquez-Perez 2017, p. 546; Flesch et al. 2017, entire). We have also included recent information on the effects of buffelgrass on the ecosystems and habitats used by pygmy-owls (Lyons et al. 2013, p. 8; Vo 2013, entire, Wied et al. 2020, p. 47; ASDM 2022, unpaginated). We also considered new information showing that pygmy-owl occupancy decreases in areas of increased roadway size, agricultural development, and other factors causing pygmy-owl habitat disturbance (Flesch 2017, p. 5; Flesch et al. 2017, entire; Flesch 2021, pp. 12–14).

Factor B—Overutilization for commercial, recreational, scientific, or educational

purposes

We have observed a recent increase in visitation by birders (2019 to present) to known pygmy-owl territories (Flesch 2018b, pers. comm., Vaughan 2019, pers. comm.), but we have not studied how that activity has affected occupancy and productivity. We also evaluated more recent information on the impacts of researchers on birds (Gibson et al. 2015, pp. 404–406; Herzog et al. 2020, p. 891).

Factor C—Disease or predation

We are not aware of any additional information regarding the effects of disease and predation on pygmy-owls since what was included in our 2011 12-month finding.

Factor D—The inadequacy of existing regulatory mechanisms

Typically, work funded or implemented by Federal agencies complies with a number of environmental laws such as the National Environmental Policy Act and the Endangered Species Act. However, under the Real ID Act, the U.S. Department of Homeland Security (DHS) waived environmental compliance for much of the border infrastructure work completed recently in Arizona and Texas (Fischer 2019, unpaginated; USCBP 2020, unpaginated). This work included the construction of taller border fencing with lights and associated access roads contributing to habitat loss and fragmentation.

Factor E—Other natural or manmade factors affecting the species' continued existence

A new potential threat to pygmy-owls was identified subsequent to our 2011 12-month finding as reported in a study that documented pesticides in pygmy-owl feathers and blood (Arrona-Rivera et al. 2016, entire). We also evaluated new information related to climate and weather impacts on pygmy-owls that affect productivity in pygmy-owls as well as pygmy-owl prey species (Flesch 2014, pp. 113–116; Flesch et al. 2015, entire; Pearce-Higgins et al. 2015, entire; Deguines et al. 2017, entire; Flesch et al. 2017, entire). We considered a more recent publication on the potential for small population size to increase extinction risk and the types of information needed to model such risk (Benson

et al. 2016, pp. 1–2, 8). During the development of the pygmy-owl SSA report, we sought peer and partner review specifically on our climate change analysis. The responses we received from climate experts were used to update our SSA report and are included in more detail in this final rule.

Additionally, we considered more recent information related to updated climate models, downscaled climate predictions, and information on drought (Bagne and Finch 2012, entire; Coe et al. 2012, entire; Jiang and Yang 2012, entire; Romero-Lankao, et al. 2014, p. 1443; Melillo et al. 2014, entire; Cook et al. 2015, p. 6; Wang et al. 2016, pp. 6–7; Dewes et al. 2017, p. 17; Easterling et al. 2017, entire; Diffenbaugh et al. 2017, entire; Gonzalez et al. 2018, entire; Christensen et al. 2018, p. 5409; Breshears et al. 2018, p. 6; Williams et al. 2020, p. 317; Bradford et al. 2020, entire; BOR 2021, entire). Furthermore, additional IPCC reports have been published since 2011, as well as National Climate Assessments, and we have included these in our climate analysis related to this final rule and the pygmy-owl SSA report (IPCC 2014b, entire; Melillo et al. 2014, entire; USGCRP 2018, chapters 23 and 25; IPCC 2022, entire). We also have new information indicating that climate extremes may be more important than averages (Germain and Lutz 2020, entire) and further evidence that climate has become, and is projected to become, more extreme within the range of the pygmy-owl (Bagne and Finch 2012, entire; Cook et al. 2015, p. 6; Diffenbaugh et al. 2017, entire; Easterling et al. 2017, entire; BOR 2021, entire). Additionally, since our 2011 12-month finding, a climate change study was published predicting a reduction in saguaros in the Sonoran Desert (Thomas et al. 2012, p. 43). Saguaros are the key nesting substrate for pygmy-owls in the Sonoran Desert.

Overall Status and Needs of Pygmy-Owls

Subsequent to our 2011 12-month finding, the IUCN published a Red List Update for the ferruginous pygmy-owl (*Glaucidium brasilianum*) and, although the status

remained the same as the 2009 Red List status (Least Concern), the Update acknowledged rangewide declines in the ferruginous pygmy-owl (BirdLife International 2016, unpaginated). We also reviewed and incorporated the updated Birds of North America ferruginous pygmy-owl account (now Birds of the World) (Proudfoot et al. 2020, entire). Additionally, new information has been published further supporting the importance of woodland vegetation and large, unfragmented habitat patches in the Sonoran Desert (Flesch et al. 2015, entire).

Additional Sources of Information

The following includes a list of information sources that were included subsequent to the proposed rule: AdaptWest Project 2015, unpaginated; AdaptWest Project 2022, unpaginated; Altar Valley Watershed Working Group 2022, entire; AGFD 2021b, pers. comm.; AGFD 2022, unpublished data; ASDM 2022, unpaginated; Arrona-Rivera et al. 2016, entire; Bhatia et al. 2019, entire; BirdLife International 2016, unpaginated; Blackie et al. 2014, entire; Bond 2022, unpaginated; Bradford et al. 2020, entire; Breshears et al. 2018, entire; Buffelgrass Working Group 2008, entire; BOR 1947, unpaginated; BOR 2021, entire; Burquez 2022, pers. comm.; Burquez and Martinez-Yrizar 1997, entire; Christensen et al. 2018, entire; Cobbold et al. 2021, entire; Cobbold et al. 2022a, entire; Cobbold et al. 2022b, entire; Cook et al. 2001, entire; Deguines et al. 2017, entire; Dewes et al. 2017, entire; Diffenbaugh et al. 2017, entire; Easterling et al. 2017, entire; Enríquez et al. 2017, entire; Flesch 2003, entire; Flesch 2014, entire; Flesch 2017, entire; Flesch 2018a, entire; Flesch 2018b, pers. comm., Flesch 2021, entire; Flesch et al. 2010, entire; Germain and Lutz 2020, entire; Gonzalez et al. 2018, entire; Gonzales 2020, unpaginated; Gornish and Howery 2019, entire; Herzog et al. 2020, entire; Inciweb 2022, unpaginated; IPCC 2014b, entire; IPCC 2022, entire; Johnson et al. 2004, entire; Johnston et al. 2021, entire; Keith 2007, entire; Lesli 2016, entire; Marris 2006, entire; Mays 1996, entire; Melillo et al. 2014, entire; Meltz and Copeland 2007, entire; Mesa-

Sierra et al. 2022, entire; Mesta 2020, pers. comm.; Murray-Tortarolo 2021, entire; NDMC 2022, unpaginated; NIFC 2022, unpaginated; INEGI 2021, unpaginated; NWS 2022, unpaginated; Pearce-Higgins et al. 2015, unpaginated; PCOSC 2021, entire; Pinal County 2019, entire; Romero-Lankao et al. 2014, entire; Texas Comptroller 2020, unpaginated; TDC 2019, entire; Texas Land Trends 2019, entire; TPWD 2022, unpaginated; U.S. Census Bureau 2021b, unpaginated; DHS 2020, unpaginated; U.S. NDMC 2022, unpaginated; EPA 2016, unpaginated; Service 2022b, unpaginated; USGCRP 2018, entire; USGS 2022, unpaginated; EBRC 2021, unpaginated; Valdez et al. 2006, entire; Vaughan 2019, pers. comm.; Vermote et al. 2014, unpaginated; Verwys 2020, pers. comm.; Verwys 2021, pers. comm.; Walker and Pavlakovich-Kochi 2003, entire; Wang et al. 2016, entire; Wied et al. 2020, entire.

I. Final Listing Determination

Background

A thorough review of the taxonomy, life history, and ecology of the cactus ferruginous pygmy-owl is presented in the SSA report. We summarize this information here.

The cactus ferruginous pygmy-owl is a diurnal, nonmigratory subspecies of ferruginous pygmy-owl and is found from central Arizona south to Michoacán, Mexico, in the west and from south Texas to Tamaulipas and Nuevo Leon, Mexico, in the east. Pygmy-owls eat a variety of prey including birds, insects, lizards, and small mammals, with the relative importance of prey type varying throughout the year.

The pygmy-owl is a small bird, approximately 17 centimeters (cm) (6.7 inches (in)) long. Generally, male pygmy-owls average 58 grams (g) to 66 g (2.0 to 2.3 ounces (oz)) and females average 70 g to 75 g (2.4 to 2.6 oz). The pygmy-owl is reddish brown overall, with a cream-colored belly streaked with reddish brown. The crown is lightly streaked, and a pair of dark brown or black spots outlined in white occurs on the nape,

suggesting eyes (Oberholser 1974, p. 451). The species lacks obvious ear tufts (Santillan et al. 2008, p. 154), and the eyes are yellow. The tail is relatively long for an owl and is reddish brown in color, with darker brown bars. Males have pale bands between the dark bars on the tail, while females have darker reddish bands between the dark bars.

Cactus ferruginous pygmy-owls are secondary cavity nesters, nesting in cavities of trees and columnar cacti, with nesting substrate varying throughout its range. Pygmy-owls can breed in their first year and typically mate for life, with both sexes breeding annually. Clutch size can vary from two to seven eggs with the female incubating the eggs for 28 days (Johnsgard 1988, p. 162; Proudfoot and Johnson 2000, p. 11). Fledglings disperse from their natal sites about 8 weeks after they fledge (Flesch and Steidl 2007, p. 36). Pygmy-owls live on average 3 to 5 years but have been documented to live 7 to 9 years in the wild (Proudfoot 2009, pers. comm.) and 10 years in captivity (Abbate 2009, pers. comm.).

Pygmy-owls are found in a variety of vegetation communities, including Sonoran desertscrub and semidesert grasslands in Arizona and northern Sonora, thornscrub and tropical dry forests in southern Sonora south to Michoacán, Tamaulipan brushland in northeastern Mexico, and live oak forest in Texas. At a finer scale, the pygmy-owl is a creature of edges found in semi-open areas of thorny scrub and woodlands in association with giant cacti and in scattered patches of woodlands in open landscapes, such as tropical dry forests and riparian communities along ephemeral, intermittent, and perennial drainages (König et al. 1999, p. 373). It is often found at the edges of riparian and xeroriparian drainages and even habitat edges created by villages, towns, and cities (Abbate et al. 1999, pp. 14–23; Proudfoot and Johnson 2000, p. 5).

The taxonomy of *Glaucidium* is complicated and has been the subject of much discussion and investigation. Following delisting of the pygmy-owl in 2006 (71 FR 19452, April 14, 2006), we were petitioned to relist the pygmy-owl (CBD and DOW

2007, entire). The petitioners requested a revised taxonomic consideration for the pygmy-owl based on Proudfoot et al. (2006a, p. 9; 2006b, p. 946) and König et al. (1999, pp. 160, 370–373), classifying the northern portion of *Glaucidium brasilianum*'s range as an entirely separate species, *G. ridgwayi*, and recognizing two subspecies of *G. ridgwayi*: *G. r. cactorum* in western Mexico and Arizona and *G. r. ridgwayi* in eastern Mexico and Texas. Other recent studies proposing or supporting the change to *G. ridgwayi* for the northern portion of *G. brasilianum*'s range have been published in the past 20 years (Navarro-Sigüenza and Peterson 2004, p. 5; Wink et al. 2008, pp. 42–63; Enríquez et al. 2017, p. 15).

As we evaluated the cactus ferruginous pygmy-owl's current status, we found that, although there is genetic differentiation at the far ends of the pygmy-owl's distribution represented by Arizona and Texas, uncertainty continues with regard to how this pattern is represented in the southern portion of the range. This latter area represents the boundary between the petitioners' two proposed subspecies (*cactorum* and *ridgwayi* within the proposed reclassification of the species *ridgwayi*), which raises the question of whether there is adequate data to support a change in species classification and define the eastern and western distributions as separate subspecies as proposed by Proudfoot et al. (2006a, entire; 2006b, entire). The Arizona Game and Fish Department (AGFD) completed additional pygmy-owl genetic sampling in the southern portion of the pygmy-owl's range in Mexico in 2022 (Cobbold et al. 2022b, entire). This work did not collect samples far enough south into southern Mexico and Central America to resolve the proposed taxonomic change of Proudfoot et al. (2006a, entire; 2006b, entire), but it did confirm that genetic differentiation does occur across the range of what is currently classified as the subspecies *cactorum*, and that this pattern of differentiation is the result of isolation by distance (Cobbold et al. 2022b, entire). Additionally, this updated analysis and additional genetic sampling did seem to answer the question of whether the

Transvolcanic Belt of Mexico at the southern end of the pygmy-owl's range presents a barrier to gene flow across this area.

Based on additional sampling conducted specifically in the area of the Transvolcanic Belt, an area hypothesized to be a potential barrier to movement and gene flow, pygmy-owl samples collected north and south of, as well as within, the Transvolcanic Belt clustered in a single genetically related group (Cobbold et al. (2022b, p. 16). This finding suggests a high degree of gene flow between these population groups. Consequently, the results suggest that the Mexican Transvolcanic Belt does not represent a dispersal barrier to pygmy-owl population groups located on either side of the geological feature within the sampled areas. Additionally, genetic differentiation followed a pattern of isolation by distance, a model under which the strongest differences in genetic structure are expected to occur at the extremities of a species' or subspecies' range (Cobbold et al. 2022b, p. 15). Between the extremities, there is gradual genetic differentiation, rather than abrupt changes, across the range. Sudden changes would be more likely to represent dispersal barriers and, therefore, boundaries between different genetic groupings. Although these datasets show that there are genetic differences across the range of the pygmy-owl, they do not provide adequate evidence of genetic differentiation along the gradient from Arizona to Texas that would warrant the taxonomic changes recommended by Proudfoot et al. (2006a, entire, and 2006b, entire). In particular, sample sizes in the southern portion of the range remain low. Samples in this portion of the range are critical to determining if there are indeed two distinct subspecies of pygmy-owl. While future work and studies may clarify and resolve these issues, we will continue to use the currently accepted distribution of *G. brasilianum cactorum* as described in the 1957 American Ornithologists' Union (now the American Ornithological Society) checklist and various other publications (Friedmann et al. 1950, p. 145; Oberholser 1974, p. 452; Johnsgard 1988, p. 159; Millsap and Johnson 1988, p.

137).

Regulatory and Analytical Framework

Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and the implementing regulations in title 50 of the Code of Federal Regulations set forth the procedures for determining whether a species is an endangered species or a threatened species, issuing protective regulations for threatened species, and designating critical habitat for endangered and threatened species. In 2019, jointly with the National Marine Fisheries Service, the Service issued a final rule that revised the regulations in 50 CFR part 424 regarding how we add, remove, and reclassify endangered and threatened species and the criteria for designating listed species' critical habitat (84 FR 45020; August 27, 2019). On the same day, the Service also issued final regulations that, for species listed as threatened species after September 26, 2019, eliminated the Service's general protective regulations automatically applying to threatened species the prohibitions that section 9 of the Act applies to endangered species (84 FR 44753; August 27, 2019).

The regulations that are in effect and therefore applicable to this final rule are 50 CFR part 424, as amended by (a) revisions that we issued jointly with the National Marine Fisheries Service in 2019 regarding both the listing, delisting, and reclassification of endangered and threatened species and the criteria for designating listed species' critical habitat (84 FR 45020; August 27, 2019); and (b) revisions that we issued in 2019 eliminating for species listed as threatened species after September 26, 2019, the Service's general protective regulations that had automatically applied to threatened species the prohibitions that section 9 of the Act applies to endangered species (84 FR 44753; August 27, 2019).

The Act defines an "endangered species" as a species that is in danger of extinction throughout all or a significant portion of its range, and a "threatened species"

as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether any species is an endangered species or a threatened species because of any of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

We use the term "threat" to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term "threat" includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term "threat" may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an "endangered species" or a "threatened species." In determining whether a species meets either definition, we must evaluate all identified threats by considering the species' expected response and the effects of the

threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species, such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an “endangered species” or a “threatened species” only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

The Act does not define the term “foreseeable future,” which appears in the statutory definition of “threatened species.” Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term “foreseeable future” extends only so far into the future as we can reasonably determine that both the future threats and the species’ responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. “Reliable” does not mean “certain”; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions.

It is not always possible or necessary to define foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial data available and should consider the timeframes applicable to the relevant threats and to the species’ likely responses to those threats in view of its life-history characteristics. Data that are typically relevant to assessing the species’ biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.

Analytical Framework

The SSA report documents the results of our comprehensive biological review of the best scientific and commercial data regarding the status of the subspecies, including an assessment of the potential threats to the subspecies. The SSA report does not represent our decision on whether the subspecies should be listed as an endangered or threatened species under the Act. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies.

To assess cactus ferruginous pygmy-owl viability, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–310). Briefly, resiliency is the ability of the subspecies to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years), redundancy is the ability of the subspecies to withstand catastrophic events (for example, droughts, large pollution events), and representation is the ability of the subspecies to adapt over time to both near-term and long-term changes in its physical and biological environment (for example, climate conditions, pathogens). In general, species viability will increase with increases in resiliency, redundancy, and representation (Smith et al. 2018, p. 306). Using these principles, we identified the subspecies' ecological requirements for survival and reproduction at the individual, population, and subspecies levels, and described the beneficial and risk factors influencing the species' viability.

In the context of the Act, resiliency, redundancy, and representation are influenced by the five listing factors described in the Act. Conversely, the measures of resiliency, redundancy, and representation can indicate the extent to which any or all of the five listing factors are influencing the viability and status of a species in the context of the Act. This relationship between resiliency, redundancy, and representation and the five listing factors is described in more detail in the **Threats, Current Condition, Future**

Scenarios, and Determination of Cactus Ferruginous Pygmy-owl Status sections of this final rule.

The SSA process can be categorized into three sequential stages. During the first stage, we evaluated the individual species' life-history needs. The next stage involved an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involved making predictions about the species' responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we used the best available information to characterize viability as the ability of a species to sustain populations in the wild over time. We use this information to inform our regulatory decision.

The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at Docket No. FWS-R2-ES-2021-0098 at <https://www.regulations.gov>.

Summary of Biological Status and Threats

In this discussion, we review the biological condition of the cactus ferruginous pygmy-owl and its resources, and the threats that influence the subspecies' current and future condition, in order to assess the subspecies' overall viability and the risks to that viability. The overall geographic range of the pygmy-owl is very large (approximately 140,625 square miles [364,217 square kilometers]) and covers two countries, the United States and Mexico. To assist in our analysis, we divided the overall geographic range of the pygmy-owl into five analysis units based upon biological, vegetative, political, climatic, geographical, and conservation differences. The five analysis units are: Arizona, northern Sonora, western Mexico, Texas, and northeastern Mexico. We analyzed each of these analysis units individually and also analyzed the viability of the subspecies in its entire range.

Threats

We reviewed the potential risk factors, and their applicable listing factor, that could be affecting the resiliency, redundancy, and representation of the pygmy-owl now and in the future including: climate change and climate condition (Factor E), habitat loss and fragmentation (Factor A), human activities and disturbance (Factors B and E), waived or ineffective regulatory mechanisms (Factor D), human-caused mortality (Factors B and E), disease and predation (Factor C), and small population size (Factor E). In this final rule, we will discuss only those factors in detail that could meaningfully impact the status of the subspecies. Those risks that are not known to have effects on pygmy-owl populations, such as disease, are not discussed here but are evaluated in the SSA report. The primary risk factors affecting the current and future status of the pygmy-owl are: (1) Habitat loss and fragmentation (Factor A), and (2) climate change and climate conditions (Factor E). We acknowledge, however, that all of the threats discussed in this final rule and the SSA report can exacerbate or contribute to these two primary threats and that it is important to consider all of the known threats to pygmy-owl populations. For a detailed description of the threats analysis, please refer to the SSA report (Service 2022a, chapter 7).

Habitat Loss and Fragmentation

Pygmy-owls require habitat elements, such as mature woodlands, that include appropriate cavities for nest sites, adequate structural diversity and cover, and a diverse prey base. Urbanization, invasive species, and agricultural or forest production are all causing a reduction in the extent of habitat and an increase in habitat fragmentation throughout the geographic range of the subspecies. In response to a comment we received during the public comment period and prior to finalizing this rule, we completed some additional analysis on the effects of certain land uses in Texas and Arizona over the past decade (2010–2020) on pygmy-owl habitat. The commenter provided results of an

analysis they did on changes in land cover within the pygmy-owl analysis areas during the time period of 2010–2015 and suggested that the impacts to pygmy-owl habitat were not as great as we presented in the proposed rule and SSA report. Because it is important to consider the scope, scale, and the factors included in different sources of data, we conducted additional analysis using data sources that provided the same type of data that the commenter used in their analysis. This allowed us to compare the results of additional sources of data with the results presented by the commenter. This additional analysis does not change the outcome of our listing decision, but it does provide additional support for our finding that areas of important pygmy-owl habitat have been lost or modified and habitat fragmentation has continued, at least in Texas and Arizona, during this time period. This further analysis can be found in appendix 6 of the SSA report (Service 2022a, appendix 6).

Urbanization

Urbanization causes permanent impacts on the landscape that potentially result in the loss and alteration of pygmy-owl habitat. Residential, commercial, and infrastructure development replace and fragment areas of native vegetation resulting in the loss of available pygmy-owl habitat and habitat connectivity needed to support pygmy-owl dispersal and demographic support (exchange of individuals and rescue effect) of population groups.

Urbanization can also have detrimental effects on wildlife habitat by increasing the channelization or disruption of riverine corridors, the proliferation of exotic species, and the fragmentation of remaining patches of natural vegetation into smaller and smaller pieces that are unable to support viable populations of native plants or animals (Ewing et al. 2005, pp. 1–2; Nabhan and Holdsworth 1998, p. 2). Human-related mortality (e.g., shooting, collisions, and predation by pets) also increases as urbanization increases (Banks 1979, pp. 1–2; Churcher and Lawton 1987, p. 439). Development of roadways

and their contribution to habitat loss and fragmentation is a particularly widespread impact of urbanization (Nickens 1991, p. 1). Data from Arizona and Mexico indicate that roadways and other open areas lacking cover affect pygmy-owl dispersal (Abbate et al. 1999, p. 54; Flesch and Steidl 2007, pp. 6–7; Flesch 2017, p. 5; Flesch et al. 2017, entire; Flesch 2021, pp. 12–14). Nest success and juvenile survival were also lower at pygmy-owl nest sites closer to large roadways, suggesting that habitat quality may be reduced in those areas (Flesch and Steidl 2007, pp. 6–7; Flesch 2017, p. 5).

From 2010 to 2020, various land uses, including urbanization, have resulted in the loss of pygmy-owl habitat in Arizona and Texas (Service 2022a, appendix 6), and this loss and fragmentation of pygmy-owl habitat is likely to continue. While there is not a direct correlation between acres of pygmy-owl habitat lost and human population growth, it is reasonable to conclude that, as human population grows, the amount of native habitat lost or fragmented will increase. From 2010 to 2020, population growth rates increased in all Arizona counties where the pygmy-owl has recently occurred: Pima (9.3 percent); Pinal (25.7 percent); and Santa Cruz (13 percent) (OEO 2018, unpaginated). Many cities and towns within the historical distribution of the pygmy-owl in Arizona experienced substantial growth between April 2010 and July 2019: Casa Grande (20.7 percent); City of Eloy (17.8 percent); City of Florence (7.7 percent); Town of Marana (41.9 percent); Town of Oro Valley (12.2 percent); and the Town of Sahuarita (20.9 percent) (U.S. Census Bureau 2021a, unpaginated). Urban expansion and human population growth trends in Arizona are expected to continue into the future. The Maricopa-Pima-Pinal Counties area of Arizona is expected to grow by as much as 132 percent between 2005 and 2050, creating rural–urban edge effects across thousands of acres of pygmy-owl habitat (AECOM 2011, p. 13). Additionally, a wide area from the international border in Nogales, through Tucson, Phoenix, and north into Yavapai County (called the Sun Corridor “Megapolitan” Area) is projected to have 11,297,000 people by 2050, a 132

percent increase from 2005 (AECOM 2011, p. 13). If build-out occurs as expected, it will encompass a substantial portion of the current and historical distribution of the pygmy-owl in Arizona.

In Texas, the pygmy-owl occurred in relatively high abundance until approximately 90 percent of the mesquite-ebony woodlands of the Rio Grande delta were cleared in 1910–1950 (Oberholser 1974, p. 452). Currently, most of the pygmy-owl habitat occurs on private ranch lands, and, therefore, the threat of habitat loss and fragmentation of the remaining pygmy-owl habitat due to urbanization may be reduced in some areas of Texas. However, urbanization and agriculture along the United States–Mexico border are likely to continue to isolate the Texas population of pygmy-owls by restricting movements between Texas and northeastern Mexico (TDC 2019, entire; Texas Land Trends 2019, entire; USGS 2022, unpaginated).

The United States–Mexico border region has a distinct demographic pattern of permanent and temporary development related to warehouses, exports, and other border-related activities, and patterns of population growth in this area of northern Mexico has accelerated relative to other Mexican States (Pineiro 2001, pp. 1–2). The Sonoran border population has been increasing faster than that State’s average and faster than Arizona’s border population; between 1990 and 2000, the population in the Sonoran border municipios increased by 33.4 percent, compared to Sonora’s average (21.6 percent) and the average increase of Arizona’s border counties (27.8 percent). Growth of urban areas in Texas is expected to result in a decrease of rural land uses, further fragmenting habitats in this region (Texas Land Trends 2019, entire). Urbanization has increased habitat conversion and fragmentation, which, along with immigration, population growth, and resource consumption, were ranked as the highest threats to the Sonoran Desert Ecoregion (Nabhan and Holdsworth 1998, p. 1). This pattern focuses development, and potential barriers or impediments to pygmy-owl movements, in a region that is important

for demographic support (immigration events and gene flow) of pygmy-owl population groups, including movements such as dispersal.

Significant human population expansion and urbanization in the Sierra Madre foothill corridor may represent a long-term risk to pygmy-owls in northeastern Mexico. From 2010 to 2015 the population in Tamaulipas increased by 8 percent to 3,527,735, and the population in Nuevo León increased by 24 percent to 5,784,442 (DataMexico 2021, unpaginated). Such increasing urbanization results in the permanent removal of pygmy-owl habitat reducing habitat availability and, more significantly, increases habitat fragmentation affecting the opportunity for pygmy-owl movements within northeastern Mexico and between Mexico and Texas. Habitat removal in northeastern Mexico is widespread and nearly complete in northern Tamaulipas (Hunter 1988, p. 8). Demographic support (rescue effect) of pygmy-owl population groups is threatened by ongoing loss and fragmentation of habitat in this area. Urbanization has the potential to permanently alter the last major landscape linkage between the pygmy-owl population in Texas and those in northeastern Mexico (Tewes 1993, pp. 28–29).

Human population growth in Sinaloa, Nayarit, Colima, and Jalisco, Mexico, is ongoing. From 2010 to 2015, the population in Sinaloa grew at a rate of 9.3 percent, Nayarit grew at a rate of 13.9 percent, Jalisco grew at a rate of 13.6 percent, and Colima grew at a rate of 12.4 percent (DataMexico 2021, unpaginated). Growth rates in these areas will likely have some concurrent spread of urbanization despite the fact that most of the growth is taking place in the large cities rather than in the rural areas (Brinkhoff 2016, unpaginated). Additionally, these Mexican States have other threats to pygmy-owl habitat occurring, such as agricultural development and deforestation, that, in combination with habitat lost to urbanization, represent threats to the continued viability of the pygmy-owl in this area (Blackie et al. 2014, p. 1; Burquez 2022, pers. comm.; Mesa-Sierra et al. 2022, entire).

Invasive Species

The invasion of nonnative vegetation, particularly nonnative grasses, has altered the natural fire regime over the Sonoran Desert ecoregion of the pygmy-owl range, in particular, but invasive species impact native habitats in other pygmy-owl analysis units as well (Esque and Schwalbe 2002, p. 165; Lyons et al. 2013, p. 71; Wied et al. 2020, entire). In areas composed entirely of native species, ground vegetation density is mediated by barren spaces that do not allow fire to carry across the landscape. However, in areas where nonnative species have become established, the fine fuel load is continuous, and fire is capable of spreading quickly and efficiently (Esque and Schwalbe 2002, p. 175; Wied et al. 2020, p. 48). As a result, fire has become a significant threat to the native vegetation of the Sonoran Desert. Sonoran Desert vegetation is not fire adapted, and many such vegetative communities in Arizona are no longer in a natural or historical state. Instead, these vegetative communities and their fire dynamics have been inalterably changed by nonnative grasses and forbs, and in some areas by woody shrubs and trees (Gornish and Howery 2019, entire). Nonnative plant communities are problematic not only for imperiled species such as the pygmy-owl, but also for land managers whose goals include forest stewardship and wildfire mitigation for public safety and natural resource protection. The Arizona Wildfire Risk Assessment Portal estimates that a substantial portion of the pygmy-owl range in Arizona (2,433,763 ha; 6,013,959 acres) has a moderate to high risk of experiencing adverse effects of wildfire in the foreseeable future. As discussed elsewhere in this final rule and in our SSA report, such adverse effects include the destruction of roosting and nesting substrate provided by mature trees and columnar cacti. Using conservative estimates from post-fire monitoring performed by the Tonto National Forest, the Arizona Department of Forestry and Fire Management (ADFFM) concluded that over 30 million saguaros could be lost and

unlikely to regenerate if a large portion of the area under risk were to burn (ADFFM 2022, pers. comm.).

Nonnative annual plants prevalent within the Sonoran range of the pygmy-owl include *Bromus rubens* and *B. tectorum* (brome grasses), *Schismus* spp. (Mediterranean grasses), and Sahara mustard (*Brassica tournefortii*) (Esque and Schwalbe 2002, p. 165; ASDM 2021, unpaginated). However, the nonnative species that is currently one of the greatest threats to vegetation communities in Arizona and Texas in the United States and northeastern and northwestern Mexico is the perennial *Cenchrus ciliaris* (buffelgrass), which is prevalent and increasing throughout much of the range of the pygmy-owl (Burquez and Quintana 1994, p. 23; Van Devender and Dimmit 2006, p. 5; Lyons et al. 2013, pp. 68–69; Wied et al. 2020, pp. 47–48).

Buffelgrass is not only fire-tolerant (unlike native Sonoran Desert plant species) but is actually fire-promoting (Halverson and Guertin 2003, p. 13; Lyons et al. 2013, p. 71). Invasion sets in motion a grass-fire cycle where nonnative grass provides the fuel necessary to initiate and promote fire. Nonnative grasses recover more quickly than native grass, tree, and cacti species and cause a further susceptibility to fire (D’Antonio and Vitousek 1992, p. 73; Schmid and Rogers 1988, p. 442). While a single fire in an area may or may not produce long-term reductions in plant cover or biomass, repeated wildfires in a given area, due to the establishment of nonnative grasses, are capable of ecosystem type-conversion from native desert scrub to nonnative annual grassland (Wied et al. 2020, p. 48). These repeated fires may render the area unsuitable for pygmy-owls and other native wildlife due to the loss of trees and columnar cacti and reduced diversity of cover and prey species (Brooks and Esque 2002, p. 336; Wied et al. 2020, p. 48).

The distribution of buffelgrass has been supported and promoted by governments on both sides of the United States–Mexico border as a resource to increase range productivity and forage production (Lyons et al. 2013, p. 65). A 2006 publication

estimates that 143,504 ha (3.5 million ac) have been converted to buffelgrass in Sonora, and that between 1990 and 2000, there was an 82 percent increase in buffelgrass coverage (Franklin et al. 2006, pp. 62, 66, 67). Following establishment, buffelgrass fuels fires that destroy Sonoran desertscrub, thornscrub, and, to a lesser extent, tropical dry forest; the disturbed areas are quickly converted to open savannas composed entirely of buffelgrass, which removes pygmy-owl nest substrates and generally renders areas unsuitable for future occupancy by pygmy-owls. Buffelgrass is now fully naturalized in most of Sonora, southern Arizona, and some areas in central and southern Baja California (Burquez-Montijo et al. 2002, p. 131) and now commonly spreads without human cultivation (Burquez et al. 1998, p. 26; Perramond 2000, p. 131; Arriaga et al. 2004, pp. 1509–1511).

Because of the significance of the issue of buffelgrass invasion in Arizona, the Governor of Arizona formed the Arizona Invasive Species Advisory Council in 2005, and the Southern Arizona Buffelgrass Working Group developed the Southern Arizona Buffelgrass Strategic Plan in 2008 (Buffelgrass Working Group 2008, entire) in order to coordinate the control of buffelgrass. Because of its negative impacts to native ecosystems, buffelgrass was declared a noxious weed by the State of Arizona in March 2005. This buffelgrass working group is now led by the Arizona-Sonora Desert Museum (ASDM). The ASDM is currently mapping the extent, and control, of buffelgrass in southern Arizona in an effort to inform and direct management activities (ASDM 2022, unpaginated). These efforts are helping to manage buffelgrass invasion in southern Arizona.

Similar issues occur in Texas. Buffelgrass is now one of the most abundant nonnative grasses in South Texas, and a prevalent invasive grass within the range of the pygmy-owl. During the 1950s, Federal and State land management agencies promoted buffelgrass as a forage grass in South Texas (Smith 2010, p. 113; Lyons et al. 2013, p.

69). Buffelgrass is very well adapted to the hot, semi-arid climate of South Texas due to its drought resistance and ability to aggressively establish in heavily grazed landscapes (Smith 2010, p. 113; Wied et al. 2020, p. 48). Despite increasing awareness of the ecological damage caused by nonnative grasses, buffelgrass is still planted in areas affected by drought and overgrazing to stabilize soils and to increase rangeland productivity. Prescribed burning used for brush control typically promotes buffelgrass forage production in South Texas (Hamilton and Scifres 1982, p. 11). Buffelgrass often creates homogeneous monocultures by out-competing native plants for essential resources (Lyons et al. 2013, p. 8). Furthermore, buffelgrass produces phytotoxins in the soil that inhibit the growth of neighboring native plants (Vo 2013, unpaginated). With regard to pygmy-owl habitat, the loss of trees and canopy cover and the creation of dense ground cover resulting from buffelgrass conversion reduces nest cavity availability, cover for predator avoidance and thermoregulation, and prey availability. Overall, buffelgrass is the dominant herbaceous cover on 10 million ha (24,710,538 acres) in southern Texas and northeastern Mexico (Wied et al. 2020, p. 47).

The impacts of buffelgrass establishment and invasion are substantial for the pygmy-owl in the United States and Mexico because conversion results in the loss of important habitat features, particularly columnar cacti and trees that provide nest sites. Buffelgrass also reduces habitat diversity by creating monocultures of buffelgrass and out-competing native vegetation species (Lyons et al. 2013, pp. 66–67; Wied et al. 2020, p. 48), which decreases prey availability for the pygmy-owl by decreasing the habitat compositional and structural diversity. Buffelgrass invasion and the subsequent fires eliminate most columnar cacti, trees, and shrubs of the desert (Burquez-Montijo et al. 2002, p. 138). This elimination of trees, shrubs, and columnar cacti from these areas is a potential threat to the survival of the pygmy-owl in the northern part of its range, as these vegetation components are necessary for roosting, nesting, protection from predators, and

thermal regulation. Invasion and conversion to buffelgrass also negatively affect the diversity and availability of prey species in these areas (Franklin et al. 2006, p. 69; Avila-Jimenez 2004, p. 18; Burquez-Montijo et al. 2002, pp. 130, 135).

Buffelgrass is adapted to dry, arid conditions and does not grow in areas with high rates of precipitation or high humidity, above elevations of 1,265 m (4,150 ft), or in areas with freezing temperatures. Areas that support pygmy-owls south of Sonora and northern Sinaloa typically are wetter and more humid, and conditions are not as favorable for the invasion of buffelgrass. Surveys completed in Sonora and Sinaloa in 2006 noted buffelgrass was present in Sonora and northern Sinaloa, but the more southerly locations were noted as sparse or moderate (Van Devender and Dimmitt 2006, p. 7). However, because buffelgrass was first introduced to Mexico in Tamaulipas and Nuevo Leon, and then subsequently to Sonora and Sinaloa (Lyons et al. 2013, pp. 68–69), buffelgrass and its associated impacts are found in all five of the pygmy-owl analysis units used in our analysis for this final rule.

Agricultural Production and Wood Harvesting

Agricultural development and wood harvesting can result in substantial impacts to the availability and connectivity of pygmy-owl habitat. Conversion of native vegetation communities to agricultural fields or pastures for grazing has occurred within historical pygmy-owl habitat in both the United States and Mexico, and not only removes existing pygmy-owl habitat elements, but also can affect the long-term ability of these areas to return to native vegetation communities once agricultural activities cease. Wood harvesting has a direct effect on the amount of available cover and nest sites for pygmy-owls and is often associated with agricultural development. Wood harvesting also occurs to supply firewood and charcoal, and to provide material for cultural and decorative wood carvings.

In Arizona, although new agricultural development is limited, the effects to historical habitat are still evident. Many areas that historically supported meso- and xeriparian habitat have been converted to agricultural lands, and associated groundwater pumping has affected the hydrology of these valleys (Jackson and Comus 1999, pp. 233, 249). These riparian areas are important pygmy-owl habitat, especially within drier upland vegetation communities like Sonoran desert scrub and semi-desert grasslands.

Habitat fragmentation as a result of agricultural development has also occurred within Texas. Brush-clearing, pesticide use, and irrigation practices associated with agriculture have had detrimental effects on the Lower Rio Grande Valley (Jahrsdoerfer and Leslie 1988, p. 1). From the 1920s until the early 1970s, over 90 percent of pygmy-owl habitat in the Lower Rio Grande Valley of Texas was cleared for agricultural and urban expansion (Oberholser 1974, p. 452). The Norias Division of the King Ranch in southern Texas has been at the center of most research on pygmy-owls in Texas (Mays 1996, entire; Proudfoot 1996, entire), but has been isolated by agricultural expansion, which has restricted pygmy-owl dispersal (Oberholser 1974). This expansion has resulted in loss of pygmy-owl habitat connectivity between pygmy-owl population groups in Texas and in Mexico. From 2010 to 2020, various land uses, including agricultural development and wood harvesting, have resulted in some loss of pygmy-owl habitat in Arizona and Texas (Service 2022a, Appendix 6), and this loss and fragmentation of pygmy-owl habitat is likely to continue based on population growth projections (HHS 2017, unpaginated; OEO 2018, unpaginated; TDC 2019, entire; Pinal County 2019, p. 126; Gonzales 2020, unpaginated).

Historically, agriculture in Sonora, Mexico, was restricted to small areas with shallow water tables, but it had, nonetheless, seriously affected riparian areas by the end of the nineteenth century. For example, in the Rio Mayo and Rio Yaqui coastal plains, nearly 1 million ha (2.5 million ac) of mesquite, cottonwood, and willow riparian forests

and coastal thornscrub disappeared after dams upriver started to operate (Burquez and Martinez-Yrizar 2007, p. 543). Other Mexican States within the range of the pygmy-owl show similar potential for habitat loss. For example, in Tamaulipas, areas under irrigation increased from 174,400 to 494,472 ha (431,000 to 1.22 million ac) between 1998 and 2004, with an area of 668,872 ha (1.65 million ac) equipped for irrigation. However, agricultural development in the States of Colima, Jalisco, Nayarit, and Nuevo Leon had decreases in the amount of irrigated lands over the same period (FAO 2007, unpaginated).

There is some evidence that historical agricultural practices by indigenous peoples and early settlers provided and potentially enhanced available pygmy-owl habitat in Arizona, primarily through the development of irrigation canals that promoted the presence of woody vegetation (BOR 1947, unpaginated; Johnson et al. 2004, p. 139). However, more recent agricultural developments typically remove areas of native vegetation resulting in pygmy-owl habitat loss and fragmentation over relatively large areas, causing reductions in ground and surface waters impacting riparian systems important to the pygmy-owl and pygmy-owl prey species, and resulting in habitat fragmentation and loss of habitat connectivity for the pygmy-owl. While the loss and fragmentation of habitat is more of an historical impact in Arizona and Texas, some agricultural development continues in these areas and some historical impacts are still evident. In Mexico, agricultural development is an ongoing threat to pygmy-owl habitat (Burquez 2022, pers. comm.).

Wood harvesting is also a potential threat to pygmy-owl habitat. Ironwood (*Olneya tesota*) and mesquite (*Prosopis* spp.) are harvested throughout the Sonoran Desert for use as charcoal, fuelwood, and carving (Burquez and Martinez Yrizar 2007, p. 545). For instance, by 1994, 202,000 ha (500,000 ac) of mesquite had been cleared in northern Mexico to meet the growing demand for mesquite charcoal (Haller 1994, p. 1).

Flesch (2021, pp. 11, 13) noted that pygmy-owl habitat impacts from charcoal operations are still occurring in Sonora. Unfortunately, woodcutters and charcoal makers used large, mature mesquite and ironwood trees growing in riparian areas (Taylor 2006, p. 12), which is the tree class that is of most value as pygmy-owl habitat. Loss of leguminous trees results in long-term effects to the soil as these trees add organic matter, fix nitrogen, and add sulfur and soluble salts, affecting overall habitat quality and quantity (Rodriguez-Franco and Aguirre 1996, p. 6-47). Ironwood and mesquite trees are important nurse plant species for saguaros, the primary nesting substrate for pygmy-owls in the northern portion of their range (Burquez and Quintana 1994, p. 11). Declining tree populations in the Sonoran Desert as a result of commercial uses and land conversion threatens other plant species and may alter the structure and composition of the vertebrate and invertebrate communities as well (Bestelmeyer and Schooley 1999, p. 644). This has implications for pygmy-owl prey availability because pygmy-owls rely on a seasonal diversity of vertebrate and invertebrate prey species; loss of tree structure and diversity reduces prey diversity and availability.

Once common in areas of the Rio Grande delta, significant habitat loss and fragmentation due to woodcutting have now caused the pygmy-owl to be a rare occurrence in this area of Texas. Oberholser (1974, p. 452) concluded that agricultural expansion and subsequent loss of native woodland and thornscrub habitat, begun in the 1920s, preceded the rapid demise of pygmy-owl populations in the Lower Rio Grande Valley of southern Texas. Because much of the suitable pygmy-owl habitat in Texas occurs on private ranches, habitat areas are subject to potential impacts that are associated with ongoing ranch activities such as grazing, herd management, fencing, pasture improvements, construction of cattle pens and waters, road construction, and development of hunting facilities. Brush-clearing, in particular, has been identified as a potential factor in present and future declines in the pygmy-owl population in Texas

(Oberholser 1974, p. 452). Conversely, ranch practices that enhance or increase pygmy-owl habitat to support ecotourism can contribute to conservation of the pygmy-owl in Texas (Wauer et al. 1993, p. 1076).

Habitat fragmentation in northeastern Mexico is extensive, with only about two percent of the ecoregion remaining intact, and no habitat blocks larger than 250 square km (96.5 square mi), and no significant protected areas (Cook et al. 2001, p. 4). Fire is often used to clear woodlands for agriculture in this area of Mexico, and many of these fires are not adequately controlled. There may be fire-extensive related effects to native plant communities (Cook et al. 2001, p. 4); however, there is no specific information available for how much area may be affected by this activity.

Areas of dry subtropical forests, important habitat for pygmy-owls in southwestern Mexico, have been used by humans through time for settlement and various other activities (Trejo and Dirzo 2000, p. 133; Blackie et al. 2014, pp. 1–2). The long-term impact of this settlement has converted these dry subtropical forests into shrublands and savannas lacking large trees, columnar cacti, and cover and prey diversity that are important pygmy-owl habitat elements. In Mexico, tropical dry forest is the major type of tropical vegetation in the country, covering over 60 percent of the total area of tropical vegetation. About 8 percent (approximately 160,000 square km (61,776 square mi)) of this forest remained intact by the late 1970s, and an assessment made at the beginning of the present decade suggested that 30 percent of these tropical forests have been altered and converted to agricultural lands and cattle grasslands (Trejo and Drizo 2000, p. 134; Mesa-Sierra et al. 2022, unpaginated). Tropical dry forests, such as *Selva baja caducifolia* and *Bosque tropical caducifolio*, are the most important reservoir of biodiversity along the Pacific coast of Mexico (Burquez 2022, pers. comm.). Extensive reductions in these habitats have occurred in the past. For instance, extensive irrigation systems have been developed along the coasts of Sinaloa and Nayarit, and in more localized areas in Jalisco,

Michoacán, and Guerrero. These and other land-transformation pressures affecting tropical dry forests have not diminished with time (Burquez 2022, pers. comm.).

Summary of Habitat Loss and Fragmentation

In summary, pygmy-owls require habitat elements such as mature woodlands that include appropriate cavities for nest sites, adequate structural diversity and cover, and a diverse prey base. These habitat elements need to be available across the geographic range of the pygmy-owl and spatially arranged to allow connectivity between habitat patches. Pygmy-owl habitat loss and fragmentation have affected, and are continuing to affect, pygmy-owl viability throughout its range.

These threats vary in scope and intensity throughout the pygmy-owl's geographic range, and specific threats are a more significant issue in certain parts of the range than in others. For example, in Arizona and Northern Sonora, pygmy-owl habitat loss and fragmentation resulting from urbanization, changing fire regimes due to the invasion of buffelgrass, and agricultural development and woodcutting are significant threats that have negatively affected pygmy-owl habitat. In Texas, historical loss of habitat has reduced the pygmy-owl range, and, in Texas and other areas of the pygmy-owl's range, these past impacts continue to affect the current extent of available pygmy-owl habitat, because of the extended time it takes for these lands to recover. Therefore, even if habitat destruction ceases, the negative effects of past land use are expected to continue in many of these areas into the future, and this will be a cumulative impact with current impacts from invasive species, agricultural development, and other land use practices (Texas Land Trends 2019, entire; Wied et al. 2020, entire; DHS 2020, unpaginated; USGS 2022, unpaginated).

One of the most pressing issues for the U.S.–Mexico border is the impact of illegal human and vehicular traffic through these unique and environmentally sensitive areas. Many of these locations now bear the scars of wildcat trails, abandoned refuse, and

trampled vegetation (Marris 2006, p. 339; Walker and Pavlakovich-Kochi 2003, p. 15). Trails and roadways remove pygmy-owl habitat features; noise and disturbance from people and vehicles disrupt important behaviors; and there is an increased risk of fire in important habitats resulting from cooking and warming fires, as well as signal fires used by cross-border immigrants and smugglers.

For the remainder of the pygmy-owl's range and habitat in Mexico (northeastern Mexico and south of Sonora), data available for our analysis were limited. Available data that we considered regarding population growth and land use patterns indicates that human population growth throughout Mexico is occurring (INEGI 2021, unpaginated; CONAPO 2014, p. 25; DataMexico 2021, unpaginated). Historical loss of pygmy-owl habitat in northeastern Mexico has occurred, and recent increases in agricultural development are occurring in Tamaulipas (FAO 2007, unpaginated). Tropical dry forests, one of the most biologically significant vegetation communities in Mexico and important pygmy-owl habitat, has been significantly reduced and is continuing to be lost (Burquez 2022 pers. comm.; Mesa-Sierra et al. 2022, unpaginated)

This information indicates that the impacts to pygmy-owl habitat discussed herein may be having different levels of effects on the populations of pygmy-owls throughout their range and, while not every activity is occurring in every analysis unit, every analysis unit is experiencing habitat loss and fragmentation (Service 2022a, appendix 5). Enríquez and Vazquez-Perez (2017, p. 546) indicate that, during the last 50 years, Mexico has seen drastic changes in land uses due to rapid urbanization and industrialization, which has been poorly planned. The result has been impacts to the natural environment, including the degradation and loss of biological diversity in Mexico. There has been limited work in Mexico, however, to understand what the direct impacts of these threats are on owl population losses and changes in distribution and abundance of subspecies in the long term (Enríquez and Vazquez-Perez 2017, p. 546).

Habitat loss and fragmentation will impact both the eastern and western populations of pygmy-owls through reduced size and number of suitable blocks of nesting habitat and nest cavity availability, loss and reduction of habitat connectivity and the ability of pygmy-owls to move across the landscape to provide demographic and genetic rescue, loss and reduction of prey availability, and the increase of potential threats related to predation, pesticides, and human disturbance.

Climate Change and Climate Conditions

Enough time has passed since the early predictions of impacts of climate change that we have seen evidence of those predicted impacts on vegetation communities across the range of the pygmy-owl (Vermote et al. 2014, unpaginated; Romero-Lankao, et al. 2014, p. 1459; Williams et al. 2020, p. 317; IPCC 2022, entire). New climate models and projections, updated Normalized Difference Vegetation Index (NDVI) datasets, and an assessment examining pygmy-owl's vulnerability to climate change have been completed since our analysis in the 2011 pygmy-owl 12-month finding (Bagne and Finch 2012, pp. 67–73; Coe et al. 2012, entire; Jiang and Yang 2012, entire; IPCC 2014b, entire; Romero-Lankao, et al. 2014, entire; Melillo et al. 2014, entire; Vermote et al. 2014, unpaginated; AdaptWest Project 2015, unpaginated; Cook et al. 2015, entire; Pascale et al. 2017, p. 806; USGCRP 2018, chapters 23 and 25; Gonzalez et al. 2018, entire; Christensen et al. 2018, p. 5409; BOR 2021, entire; AdaptWest Project 2022, unpaginated; IPCC 2022, entire). These projections continue to predict impacts at the same or increasing levels upon the landscape in areas where the pygmy-owl occurs.

In the SSA report, the proposed rule, and this final listing rule, we used newer modeling related to climate that was not used in our 2011 12-month finding, and this change reduced the subjectivity of our approach to evaluate the effects to pygmy-owl habitat effects (Vermote et al. 2014, unpaginated; AdaptWest Project 2015, unpaginated; Wang et al. 2016, pp. 6–7; Dewes et al. 2017, p. 17; Diffenbaugh et al. 2017, entire;

AdaptWest Project 2022, unpaginated; Service 2022a, chapter 6, appendices 2 and 3).

Furthermore, additional IPCC reports have been published since 2011, as well as National Climate Assessments, and we have included the appropriate information found in these sources in our climate analysis to ensure that we considered the most current and best information available. These sources represent the current understanding of the evidence and effects of climate change (IPCC 2014b, entire; Melillo et al. 2014, entire; USGCRP 2018, chapters 23 and 25; IPCC 2022, entire).

Climate change projections within the geographic range of the pygmy-owl show that increasing temperatures, decreasing precipitation, and increasing intensity of weather events are likely (Karmalkar et al. 2011, entire; Bagne and Finch 2012, entire; Coe et al. 2012, entire; and Jiang and Yang 2012, entire; BOR 2021; p. 23). Climate influences pygmy-owl habitat conditions and availability through the loss of vegetation cover, reduced prey availability, increased predation, reduced nest site availability, and vegetation community change. The majority of the current range of the pygmy-owl occurs in tropical or subtropical vegetation communities, which may be reduced in coverage if climate change results in hotter, more arid conditions. Extended drought has and continues to affect vegetation communities used by the pygmy-owl in the United States (NDMC 2022, unpaginated). Additionally, models predict that the distribution of suitable habitat for saguaros, the primary pygmy-owl nesting substrate within the Sonoran Desert ecoregion, will substantially decrease over the next 50 years under a moderate climate change scenario (Weiss and Overpeck 2005, p. 2074; Thomas et al. 2012, p. 43).

Climate change scenarios project that drought will occur more frequently and increase in severity, with a decrease in the frequency and increase in severity of precipitation events (Seager et al. 2007, p. 9; Cook et al. 2015, p. 6; Pascale et al. 2017, p. 806; Williams et al. 2020, p. 317; BOR 2021, p. 23). Drought and changes to the timing

and intensity of precipitation events may reduce available cover and prey for pygmy-owls adjacent to riparian areas through scouring flood events and reduced moisture retention. The extent to which changing climatic patterns will affect the pygmy-owl is better understood following the past decade of observations in the field. For example, in northern Sonora, the summer monsoon's precipitation (or lack thereof) has a significant effect on whether or not juvenile pygmy-owls reach adulthood, as the lizards preferred by these owls are more abundant when summer precipitation does not fall below normal levels. Climate change has made the amount of summer precipitation more variable than it used to be. Average summer monsoons in the Sonoran Desert produce 2.43 inches of rain. In years like 2019 and 2020, however, when summer rainfall was significantly below average (0.66 inches and 1.0 inches respectively), there was less prey for juveniles to eat as they entered adulthood, and thus fewer owls survived. In years like 2015–2016, when the amount of precipitation from the summer monsoon was above average, more juveniles survived to adulthood and owl population levels in those years did not decline (Flesch 2021, entire).

Synergistic interactions are likely to occur between the effects of climate change and habitat fragmentation and loss. Climate change projections indicate that conditions will likely favor increased occurrence and distribution of nonnative, invasive species and alteration of historical fire regimes. Climate change may also affect the viability of the pygmy-owl through precipitation-driven changes in plant and insect biomass, which in turn influence abundance of lizards, small mammals, and birds (Jones 1981, p. 111; Flesch 2008, p. 5; Flesch et al. 2015, p. 26). Decreased precipitation generally reduces plant cover and insect productivity, which in turn reduces the abundance and availability of pygmy-owl prey species. Similarly, increased temperatures reduce pygmy-owl prey activity due to increased energetic demands of thermoregulation and a decreased availability of prey and cover (Flesch 2014, p. 116; Flesch et al. 2015, p. 26). These

indirect effects on prey availability and direct effects on prey activity affect nestling growth, development, and survival. When decreased precipitation affects food supply and increased temperature affects prey activity, reduced pygmy-owl productivity is likely to result in reduced pygmy-owl resiliency (Flesch et al. 2015, p. 26).

A recent downscaled hydroclimate study reported predicted climate impacts within the range of the pygmy-owl in Arizona (BOR 2021, entire). In general, the scenarios for the greenhouse gas emissions model that approximates our current trajectory predicts that monsoonal rain will be reduced, as well as more highly variable. Temperatures will also increase significantly during both winter (between 1.88° Fahrenheit (F) and 3.20° F) and summer (between 2.59° F and 3.34° F). As a result, streamflow throughout the area covered by this effort, including the Avra and Altar valleys, which are occupied by pygmy-owls, is likely to be reduced, which would negatively impact infiltration into the aquifer. These changes are likely to impact pygmy-owls and their prey species in a variety of ways, many of them negative. For example, increased evapotranspiration and reduced soil moisture could negatively impact prey species that pygmy-owls depend on, reduce the amount and/or quality of vegetation necessary for roosting, thermoregulation, and predator avoidance, amplify fire risk and concomitant compromise of necessary woodland vegetation and availability of mature saguaro cacti, as well as lead to reduced nestling fitness if nest cavity temperatures rise too high (Flesch et al. 2015, p. 26; Service 2022a, chapter 6; Flesch 2021, entire). Climate change can also influence natural events, such as hurricanes and tropical storms, which can modify and fragment pygmy-owl habitats, primarily through loss of woody cover, as evidenced in Texas and northeastern Mexico (Hurricane Harvey in 2017, Hurricane Hanna in 2020, and Hurricane Ida in 2021). Historical and ongoing threats to the pygmy-owl from habitat loss and fragmentation as well as from climate change and

climate conditions, have shaped the current habitat and population conditions of the subspecies throughout its range.

In summary, climate change and its associated change in conditions on the landscape will impact both the eastern and western pygmy-owl populations through habitat loss and fragmentation, reduced nest cavity availability, reduced prey populations, lower productivity, and reduced survivability.

Current Condition

To assess resiliency, we evaluated six components that broadly related to the subspecies' population demography or physical environment and for which we had data sufficient to conduct the analysis. We assessed each analysis unit's physical environment by examining three components determined to have the most influence on the subspecies: habitat intactness, prey availability, and vegetation health and cover (Flesch 2017, entire). We also assessed each analysis unit's demography through abundance, occupancy, and evidence of reproduction. We established parameters for each component by evaluating the range of existing data and separating those data into categories based on our understanding of the subspecies' demographics and habitat. Using the demographic and habitat parameters, we then categorized the overall condition of each analysis unit. We provide a summary of each of the six factors below and describe them in detail in the SSA report (Service 2022a, entire).

Demographic Factors

Abundance: Larger populations have a lower risk of extinction than smaller populations (Pimm et al. 1988, pp. 773–775; Trombulak et al. 2004, p. 1183). Small populations are less resilient and more vulnerable to the effects of demographic, environmental, and genetic stochasticity, and have a higher risk of extinction than larger populations (Trombulak et al. 2004, p. 1183). Small populations may experience increased inbreeding, loss of genetic variation, and ultimately a decreased potential to

adapt to environmental change (Trombulak et al. 2004, p. 1183; Harmon and Braude 2010, p. 125; Benson et al. 2016, pp. 1–2). The abundance of pygmy-owls within each analysis unit must be high enough to support persistence of pygmy-owl population groups (multiple breeding pairs of pygmy-owls within relatively discrete geographic areas) within the analysis unit. This persistence of population groups is accomplished by having adequate patches of habitat to support multiple nesting pairs of pygmy-owls and their offspring, having adequate habitat connectivity to support establishment of additional territories by dispersing young, and having a supply of floaters (unpaired individuals of breeding age) within each pygmy-owl population group to offset loss of breeding adults and to provide potential mates for dispersing juveniles. In order to compare the resiliency of the individual analysis units, we estimated the general magnitude of the abundance of pygmy-owls within each analysis unit (Service 2022a, chapter 6 and table 4.2). However, these estimates of the magnitude of abundance should not be construed as actual population estimates (see *Summary of Current Condition of the Subspecies* below).

Occupancy: Sufficiently resilient pygmy-owl populations must occupy large enough areas such that stochastic events and environmental fluctuations that affect individual pygmy-owls, or population groups of pygmy-owls, do not eliminate the entire population. Pygmy-owls are patchily distributed across the landscape in population groups of nesting owls. Each of these population groups must contain a high enough abundance of pygmy-owls to enable the population group to persist on the landscape over time. Enough occupied population groups of pygmy-owls must also exist on the landscape, with interconnected habitat supporting movement among population groups, so that each population group can receive or exchange individuals with any given adjacent population group.

Pygmy-owl occupancy is an indicator of habitat conditions as well as demographic factors, such as reproduction and survival. Habitats that support a high abundance of pygmy-owls are better able to provide floaters and available mates to dispersing pygmy-owls from adjacent populations. These floaters are able to serve as replacement breeders if either or both members of an existing breeding pair are lost. Observations indicate that if a site is occupied by a breeding pair, they will breed. Survival of adults also affects occupancy, as some occupied sites will be abandoned if one of the adult breeders perishes. These sites can be reoccupied in the future when floaters or dispersing birds move into the area.

Evidence of reproduction: Adequately resilient pygmy-owl populations must also reproduce and produce a sufficient number of young such that recruitment equals or exceeds mortality. Current population size and abundance reflects previous influences on the population and habitat, while reproduction and recruitment reflect population trends that may be stable, increasing, or decreasing in the future. Adequately resilient populations of the pygmy-owl must have sufficient abundance to replace members of breeding pairs that have been lost and to support persistent population groups of nesting pygmy-owls through dispersal. However, the necessary reproductive rate needed for a self-sustaining population is unknown. Additionally, key demographic parameters of pygmy-owl populations (e.g., survival, life expectancy, lifespan, productivity, etc.) are unknown throughout most of the geographic range. Due to the lack of information on demographic parameters of reproduction, recruitment, and survival, we broadly considered evidence of reproduction to include any evidence of reproduction (e.g., active nests, presence of eggs or nestlings, fledglings, etc.), as well as persistence of occupied territories and population groups in an area over a sufficient amount of time to indicate evidence of reproduction. Thus, evidence of reproduction on a consistent basis over time likely indicates a sufficiently resilient population.

Habitat intactness: Adequately resilient pygmy-owl populations need intact habitat that is large enough to support year-round occupancy, as well as connectivity between habitat patches to enable dispersal. As the baseline for our analysis of habitat intactness, we modeled suitable vegetation types across the range of the pygmy-owl that provide habitat for the pygmy-owl (Service 2022a, chapter 6 and appendix 1). We know that the modeled suitable vegetation does not equal pygmy-owl habitat and that the acres of suitable vegetation are greater than the actual acres of pygmy-owl habitat. However, modeled suitable vegetation does provide a surrogate for acres of pygmy-owl habitat. Pygmy-owls are patchily distributed across much of their geographic range. These pygmy-owl population groups are dependent on interchange of individuals in order to maintain adequate abundance and genetic diversity on the landscape. Habitat connectivity is crucial to maintaining pathways for the interchange of individuals among pygmy-owl population groups (Flesch 2017, entire).

Prey availability: Adequate prey availability is a key component for maintaining resiliency in pygmy-owl populations. Year-round prey availability is essential throughout the range of the pygmy-owl, with portions of the geographic range characterized by seasonal variability in available prey resources. The abundance of many of these prey species is influenced by annual and seasonal precipitation through increases and decreases in vegetation cover and diversity, which also influences insect abundance and availability. Sufficiently resilient pygmy-owl populations require adequate precipitation to support year-round prey availability. This includes appropriately timed precipitation to support seasonally available prey such as lizards, insects, and small mammals.

Vegetation cover: Sufficiently resilient pygmy-owl populations require adequate vegetation to provide cover for predator avoidance, thermoregulation, hunting, and nest cavities. Of primary importance for cover is the presence of woody vegetation canopy.

Maintenance of the health and vigor of this woody cover is a key component to maintaining resiliency of pygmy-owl populations.

Summary of Current Condition of the Subspecies

Currently, the cactus ferruginous pygmy-owl occurs from southern Arizona, south to Michoacán in the western portion of its range, and from southern Texas to Tamaulipas and Nuevo Leon in the eastern portion of its range. For our analysis, we divided the pygmy-owl's overall range into five analysis units: Arizona, northern Sonora, western Mexico, Texas, and northeastern Mexico (see Figure 1). In order to compare the resiliency of the individual analysis units, we estimated the general magnitude of the abundance of pygmy-owls within each analysis unit (Service 2022a, chapter 6 and table 4.2). This estimated magnitude of abundance is one of the demographic factors used to evaluate the resiliency of each analysis unit. These estimates of the magnitude of abundance should not be construed as actual population estimates. We lack sufficient data to make any statistically meaningful population estimates for any of the analysis units. Rather, these estimates of the magnitude of pygmy-owl abundance are used as a tool to compare the general abundance of pygmy-owls in each analysis unit.

The primary factors currently affecting the condition of cactus ferruginous pygmy-owl populations include changing climate conditions, and habitat fragmentation and loss. The threats contributing to or resulting from these two primary factors do not occur consistently across all analysis units, but all analysis units are being impacted by one or more of the threats discussed in this final rule and the SSA report (see Service 2022a, appendix 5 for a more detailed discussion of the particular threats impacting each analysis unit). Information from the northern Sonora analysis unit provides evidence of what factors contribute to the viability of pygmy-owl populations. Flesch (2014, pp. 114–117) showed that, at least in the northern portion of the western pygmy-owl population, pygmy-owl abundance was consistently higher and varied less in areas with more nest

cavities, more riparian vegetation, and lower land-use intensity, suggesting these factors are important drivers of pygmy-owl habitat quality. We have also identified which of the five listing factors identified in the Act are influencing the current condition of the pygmy-owl.

Resiliency

The Arizona analysis unit currently has the lowest pygmy-owl abundance of all analysis units, which is estimated to be in the low hundreds. Habitat fragmentation and loss from urbanization and increases in invasive species such as buffelgrass, have reduced the availability and connectivity of habitat in this analysis unit (Factor A). Additionally, climate conditions have reduced prey availability and vegetative cover through increased temperatures and drought (Factor E). These factors result in a reduced capacity for this analysis unit to withstand stochastic events and result in a low resiliency currently.

The northern Sonora analysis unit has an estimated pygmy-owl abundance in the high hundreds. However, this analysis unit is affected by habitat fragmentation from urbanization, agricultural development, and associated infrastructure (Flesch 2021, pp. 12–14) (Factor A). These stressors increase water use and, in conjunction with climate conditions, result in a reduction in the quality and availability of pygmy-owl habitat (Factor A). Abundance of pygmy-owls in the Sonoran Desert in northwest Mexico, for example, declined about 19–27 percent over a 12-year period, and change in owl abundance was highly associated with variation in precipitation and temperature (Factor E). In addition, hot, dry conditions influence the behavior and health of prey species the owl relies upon for food. For example, lizards are both less abundant and move less frequently as temperatures rise, making it more difficult for owls to spot and capture them (Flesch 2021, entire).

Based on moderate owl abundance and some decrease in habitat availability and connectivity, the northern Sonora analysis unit has a moderate level of population resiliency. Information from surveys and monitoring in 2021 in the northern Sonora analysis unit indicated a decline in pygmy-owl occupancy and an increase in habitat loss and fragmentation (Flesch 2021, pp. 12–14) and is evidence of decreasing resiliency in this analysis unit.

The western Mexico analysis unit is estimated to have tens of thousands of pygmy-owls. This analysis unit has some habitat fragmentation from urbanization, agricultural development, and deforestation of the tropical dry forests (Factor A). Overall, the western Mexico analysis unit has high population resiliency due to high abundance of pygmy-owls and generally healthy vegetation cover, likely as a result of higher levels of precipitation in the region than in other parts of the pygmy-owl's range.

The Texas analysis unit has an estimated pygmy-owl abundance in the high hundreds. Land ownership within this analysis unit has resulted in habitat fragmentation (Factor A) and, due to agricultural development and wood harvesting within the Rio Grande Valley, this analysis unit is somewhat genetically isolated from the rest of the geographic range of the subspecies (Factor E). Due to moderate pygmy-owl abundance, fragmentation of habitat, and some genetic isolation, the Texas analysis unit has a moderate level of population resiliency.

The northeast Mexico analysis unit is estimated to have tens of thousands of pygmy-owls. However, this unit has high levels of habitat fragmentation due to urbanization and agricultural development (Factor A). Overall, the northeast Mexico analysis unit has a moderate level of population resiliency with some capacity to withstand stochastic events. Rangewide, current condition of the pygmy-owl populations indicate that three analysis units are maintaining a moderate level of population resiliency, one analysis has low resiliency, and one analysis unit has high resiliency.

Representation

Resiliency, and the factors that drive resiliency, also contribute to the pygmy-owl's representation on the landscape. Pygmy-owls occupy a diversity of habitat types throughout the geographic range of the subspecies and maintain substantial genetic diversity. The subspecies' adaptive potential (representation) is currently high due to genetic and ecological variability across the range. There is substantial genetic diversity across the range (Proudfoot et al. 2006a, entire; 2006b, entire; Cobbold et al. 2022b, entire) due to isolation-by-distance and geographic barriers. Additionally, across the range, the pygmy-owl occupies a diverse range of ecological settings as a result of geographic gradients of vegetation, climate, elevation, topography, and other landscape elements. Such ecological diversity could help the pygmy-owl adapt to and survive future environmental changes, such as warming temperatures or decreased precipitation from climate change.

Redundancy

We assessed the number and distribution of population groups across the pygmy-owl's geographic range as a measure of its redundancy. While the abundance and densities of pygmy-owls are lower in some analysis units, these portions of the range still contribute in a meaningful way to the overall pygmy-owl population. Each analysis unit within the geographic range of the subspecies maintains a network of population groups that are connected both within and between analysis units. These population groups have the potential to recolonize areas where other population groups are lost to catastrophic events. All analysis units contribute to the total rangewide population, and population groups within each analysis unit provide population support for that analysis unit and adjacent portions of the range. If an analysis unit is self-sustaining, it provides redundancy across the range, and may provide emigrants to support adjacent analysis units.

Exchange of individual cactus ferruginous pygmy-owls occurs among population groups within the Arizona, northern Sonora, and Texas analysis units, and between the Arizona and northern Sonora analysis units (Abbate et al. 2000, p. 30; Flesch and Steidl 2007, p. 37; Proudfoot et al. 2020, unpaginated; AGFD 2022, unpublished data). Habitat fragmentation and reduced vegetation health, as a result of ongoing drought and various land uses, have resulted in the extirpation of population groups in Arizona and Texas (Factor A), but redundancy was exhibited in the northern Sonora analysis unit when drought conditions eased and historically occupied areas were reoccupied (Flesch et al. 2017, p. 12). However, abundance has once again declined in northern Sonora and increased habitat loss and fragmentation likely are decreasing pygmy-owl habitat connectivity within this analysis unit and likely between the northern Sonora and Arizona analysis units (Factor A) because both analysis units are experiencing similar conditions (Flesch et al. 2017, entire; Flesch 2021, p. 9).

Despite existing habitat fragmentation, exchange of individual pygmy-owls occurs between population groups and between some analysis units is still occurring (Abbate et al. 2000, p. 30; Flesch and Steidl 2007, p. 37; Proudfoot et al. 2020, unpaginated; AGFD 2022, unpublished data). Habitat types used by pygmy-owls vary across the range, with some vegetation types being restricted to certain portions of the geographic range. It is important to maintain pygmy-owl populations throughout the range to provide redundancy to adjacent populations in similar habitat conditions. Due to the broad geographic distribution and network of population groups that are connected within and between some analysis units throughout most of its range, the pygmy-owl has some ability to recolonize following catastrophic events (Flesch et al. 2017, p. 12) and is considered to have adequate redundancy.

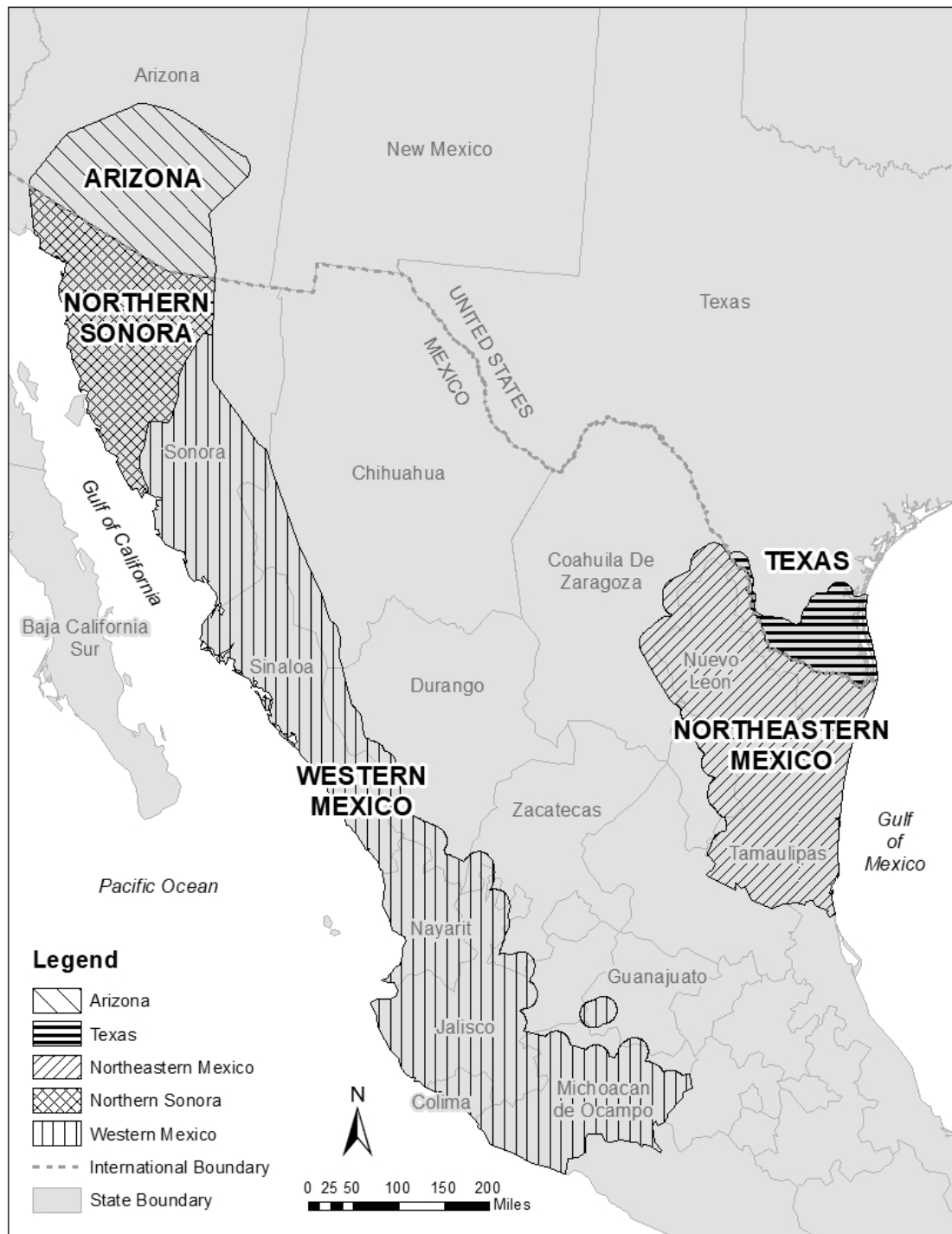


Figure 1. Cactus ferruginous pygmy-owl's range in the United States and Mexico, including the five analysis units used in the species status assessment.

Future Scenarios

In our SSA report, we defined viability as the ability of a species to sustain populations in the wild over time. To help address uncertainty associated with the degree and extent of potential future stressors and their impacts on species' needs, we assessed

the principles of resiliency, redundancy, and representation using three plausible future scenarios that represent a reasonable range of outcomes that we expect could occur. We developed these scenarios by identifying information on the following primary factors anticipated to affect the cactus ferruginous pygmy-owl in the future: climate change, habitat loss and fragmentation, and ongoing conservation efforts (Flesch 2017, entire). The three scenarios capture the range of uncertainty in the changing landscape and how the pygmy-owl would likely respond to changing conditions.

We used the best available data and models to project out 30 years into the future (i.e., 2050). This is appropriate because, as we discuss later in the document, we define 30 years as the foreseeable future for our analysis of pygmy-owl viability and whether the species is a threatened species. We chose this timeframe based on the subspecies' lifespan and observed cycles in population abundance, as well as the time period where we could reasonably project certain land use changes and urbanization patterns relevant to the pygmy-owl and its habitat. The majority of existing projections of urbanization and population growth within the geographic range of the pygmy-owl extend to 2050. Because urbanization and development are some of the primary drivers of habitat loss and fragmentation, we extended our analysis as far as we could reasonably project these changes and the subspecies' response to those changes. Additionally, the average lifespan of a pygmy-owl is 3 to 5 years. Thus, over a 30-year timeframe, we would expect 8 to 10 generations of pygmy-owls to be produced, which should be an adequate amount to assess the long-term effects of both threats and conservation actions. Because the primary avenue through which pygmy-owls move across the landscape is through the dispersal of juveniles, it can take multiple generations to provide adequate exchange of individuals to elicit detectable changes at the population group and analysis unit scales. Including multiple generations of pygmy-owls also allows adequate time to account for lags in demographic factors resulting from changes in environmental conditions. Therefore, we

conclude that this number of generations is sufficient to assess the effective levels of resiliency, redundancy, and representation.

Monitoring of pygmy-owl occupancy and productivity also indicates that, at least in Arizona and northern Sonora, 30 years is an adequate time period to document abundance cycles driven by climate conditions. Monitoring in both Arizona and northern Sonora from the mid-1990s to the present time showed a period of decline in occupancy and productivity, primarily due to drought, followed by an increase in productivity and occupancy during years of better precipitation such that abundance and occupancy recovered to nearly the original levels (Flesch et al. 2017, p. 12; Ingraldi 2020, pers. comm.; Service 2022a, entire). For more information on the models and their projections, please see the SSA report (Service 2022a, entire). Below, we also identify which of the five listing factors identified in the Act are influencing the pygmy-owl under each future scenario.

Under Scenario 1 (continuation of current trends), we projected no significant changes to the rate of habitat loss and fragmentation within the subspecies' range (Factor A). For this scenario, we considered that climate change would track Representative Concentration Pathway (RCP) 4.5, which is one of four alternative trajectories for carbon dioxide emissions set forth by the International Panel on Climate Change (IPCC 2014a, pp. 8–9). Specifically, RCP 4.5 is an intermediate scenario where carbon dioxide emissions continue to increase through 2040, but then stabilize and begin to decline. This scenario would result in atmospheric carbon dioxide levels between 580 and 720 parts per million (ppm) between 2050 and 2100, well above current rates of approximately 415 ppm, and would represent an approximately 2.5 °Celsius (C) increase in global mean temperature relative to the period 1861–1880 (IPCC 2014a, p. 9) (Factor E). We also considered that current conservation efforts, such as captive rearing, would continue to be limited in their efficacy, due to limited resources for agencies and other conservation

partners to expand implementation. However, we would expect conservation efforts to improve modestly with continued efforts to identify appropriate and effective methodologies and protocols that mitigate the primary limitations to the success of releasing captive-reared pygmy-owls. Additionally, climate change will continue to affect the suitability of conditions at release sites (poor habitat conditions, reduced prey availability, etc.) for captive-reared pygmy-owls, likely limiting the effectiveness of pygmy-owl releases unless those effects can be mitigated through project protocols (Factor E).

Under these conditions, we do not anticipate that any of the factors used to evaluate resiliency would improve and, in fact, vegetation intactness would be reduced due to continued development (Factor A). Northeastern Mexico is projected to maintain its current level of pygmy-owl abundance because, relative to the current condition, substantial changes to habitat conditions are not expected, primarily because our analysis indicates reduced impacts from climate change on remaining habitat relative to other analysis units. Because of this, the northeastern Mexico analysis unit is expected to maintain a moderate level of population resiliency under this scenario. Conditions in the Arizona analysis unit would continue to decline due to continued habitat fragmentation and climate change (Factor A), and resiliency would remain low. Resiliency in the remaining three analysis units, northern Sonora, western Mexico, and Texas, would decline due to continued loss of pygmy-owl habitat, reduced habitat intactness, and a reduction in cover and prey availability for cactus ferruginous pygmy-owls (Factor A). Overall, current levels of population redundancy and representation would be maintained rangewide, but at a reduced rate. All analysis units would remain occupied; however, representation within each analysis unit would likely decline at the population-group scale.

Under Scenario 2 (worsening or increased effects scenario), we projected increased rates of habitat loss and fragmentation when compared to the current condition and over and above that projected under Scenario 1, leading to a decline in pygmy-owl habitat conditions (Factor A). For this scenario, we considered that climate change would track RCP 8.5, which is the highest greenhouse gas emission scenario. Under this scenario, atmospheric carbon dioxide concentrations are projected to exceed 1,000 ppm between 2050 and 2100 and would represent a 4.5 °C increase in global mean temperature (IPCC 2014a, p. 9) (Factor E). We also assumed that conservation efforts that are currently underway would not be effective or would not be implemented.

Increased habitat loss and fragmentation would result in the greatest effect on overall resiliency through a reduction in abundance and occupancy of pygmy-owls. Increased development and urbanization would result in increased permanent losses of habitat (Factor A). Indirect effects to vegetation and prey availability as a result of climate change would also occur (Factor E). Due to increased habitat fragmentation, such as agricultural development, as well as a reduction in vegetation health from drought (Factor A), resiliency in the western Mexico analysis unit is projected to decline. Under this scenario, climate change and increased habitat fragmentation from urbanization and agricultural development lead to the loss of some population groups within the Texas, Arizona, and northern Sonora analysis units (Factor A, Factor E). The resultant decline would decrease representation and redundancy within these analysis units. In particular, the Texas and Arizona analysis units would become more vulnerable to extirpation because of low pygmy-owl abundance and occupancy driven by reduced habitat quality as a result of drought and high levels of habitat fragmentation from ongoing urbanization and agricultural development (Factor E, Factor A). Genetic representation would be reduced through the loss of population groups or analysis units and the subsequent reduction of gene flow (Factor E). Overall, there would be a reduction in resiliency,

representation, and redundancy within most analysis units, and the likelihood of maintaining long-term viability would be considerably reduced.

Under Scenario 3 (improving or reduced effects scenario), we project that habitat loss and fragmentation would continue, but at a reduced rate (Factor A). For this scenario, we considered that climate change would track RCP 4.5 (Factor E), and conservation efforts that are currently underway would be effective. We did not include other planned conservation efforts in this scenario because we are not aware of any that would significantly influence the viability of the subspecies.

Despite effective conservation actions in portions of the range, the viability of pygmy-owl populations would continue to decline within all five analysis units due to the ongoing effects of habitat loss, fragmentation, and climate change (Factor A, Factor E). The positive effects of conservation actions would remain localized, and the negative effects of the ongoing threats would outweigh these local benefits to individual population groups at the scale of the entire analysis unit. Resiliency would remain low in the Arizona analysis unit and would decline in both the northern Sonora and western Mexico analysis units due to a reduction in habitat quality as a result of climate change (Factor E). We would expect pygmy-owl habitat fragmentation from urbanization, deforestation, and agricultural development (Factor A) to continue under this scenario, though at a slower rate because of increased efforts to address the impacts from climate change and to improve land use decisions, as well as implementing habitat-related conservation actions. Resiliency would remain in moderate condition for the Texas and northeastern Mexico analysis units. Although habitat conditions are expected to continue to decline due to drought and climate change (Factor E), we do not expect a large decline in pygmy-owl occupancy and abundance in Texas and northeastern Mexico. Under this scenario, each analysis unit remains occupied and contributes to the representation and redundancy across the range of the pygmy-owl. However, within each analysis unit,

threats continue, albeit at a reduced rate, and the resiliency of population groups would decline in three of the five analysis units. Thus, within analysis units, representation and redundancy is likely to decrease at the population-group scale.

Cumulative Effects

We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have analyzed not only individual effects on the subspecies but also their potential cumulative effects. We incorporate the cumulative effects into our SSA analysis when we characterize the current and future condition of the subspecies. To assess the current and future condition of the subspecies, we undertake an iterative analysis that encompasses and incorporates the threats individually and then accumulates and evaluates the effects of all the factors that may be influencing the subspecies, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire subspecies, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative effects analysis.

Conservation Efforts and Regulatory Mechanisms

In this section, we discuss regulatory mechanisms and conservation actions that potentially have influenced or will likely influence the current and future viability of the cactus ferruginous pygmy-owl.

Federal Protections

The pygmy-owl is protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703–712). The MBTA prohibits “take” of any migratory bird. However, unlike the Act, there are no provisions in the MBTA preventing habitat destruction unless direct mortality or destruction of an active nest also occurs. Approximately 31 percent of the pygmy-owl’s historical geographic range in the United States is federally owned, with federally-owned lands making up approximately 40 percent of pygmy-owl habitat in

Arizona. However, a substantial extent of the known currently occupied habitat occurs on State Trust lands in Arizona and on private lands in Texas. Other Federal regulations and policies such as the Clean Water Act (33 U.S.C. 1251 et seq.), the military's integrated natural resources management plans (INRMPs, such as the one for the Barry M. Goldwater Range) (Uken 2008, pers. comm.), and National Park Service policy provide varying levels of protection, but they have not, to this date, been effective in protecting the pygmy-owl from further decline as National Park Service owned lands comprise only a small portion of the range of the pygmy-owl.

Regulations under and implementation of the Clean Water Act help provide protections for a range of riparian habitat that is important to the pygmy-owl. Court actions and changes in regulations have decreased the potential scope of protections for riparian habitats within the range of the pygmy-owl. The 2006 *Rapanos* Supreme Court decision restricts the linear extent of jurisdiction to watercourses having a "significant nexus" with a Traditionally Navigable Water. This means that after the Court's decision was implemented starting in 2008, fewer watercourses were deemed jurisdictional. This ruling has had the effect of further reducing past protections of riparian habitats. This limitation in the extent of federal jurisdiction particularly affected ephemeral streams in the pygmy-owl's Arizona habitat. Based on the individual approved jurisdictional determinations in Pima County by the U.S. Army Corps of Engineers, it is likely that most of the Avra-Altar system, which supports pygmy-owl occupancy, will be found to lack significant nexus to the Colorado River system, which means that these habitats will not receive the same analysis and protection that they received in the past under the Clean Water Act (Meltz and Copeland 2007, entire; Keith 2007, entire).

As a result of the implementation of the 2005 Real ID Act (Division B of Pub. L. 109-13), the U.S. Department of Homeland Security (DHS) has waived application of the Act and other environmental laws in the construction of border infrastructure,

including areas occupied by the pygmy-owl (73 FR 5272, January 29, 2008). As recently as 2020, DHS waived environmental compliance for the construction of border walls along the U.S.–Mexico border in Arizona and Texas (Fischer 2019, unpaginated; USCBP 2020, unpaginated). Consequently, pygmy-owl habitat has been lost and fragmented along most of the border area in Arizona, as well as in Texas. Of particular concern is the potential for border infrastructure to reduce habitat connectivity into occupied pygmy-owl habitat in Mexico (Flesch et al. 2010, pp. 177–179).

State Protections

The pygmy-owl is included on the State of Arizona’s list of species of concern (AGFD 2021a, p. 16). Arizona statutes (ARS Title 17) only protect individual pygmy-owls and their nests or eggs and do not address destruction or alteration of pygmy-owl habitat. The State of Texas lists the pygmy-owl as threatened (Texas Administrative Code, title 31, part 2, chapter 65, subchapter G, rule 65.175; TPWD 2009, unpaginated; TPWD 2022, unpaginated). This designation allows permits to be issued for the taking, possession, propagation, transportation, sale, importation, or exportation of pygmy-owls if necessary to properly manage that species but, similar to Arizona, does not provide any habitat protections (Texas Park and Wildlife Code, chapter 67, section 67.0041).

Texas and Arizona state law prohibit any take (incidental or otherwise) of state-listed or protected species. In both states, species may only be handled by persons possessing a scientific activity permit, scientific permit for research, or other form of authorization from the State. While state laws in both Texas and Arizona prohibit the capture, trap, take, or kill, or attempt to capture, trap, take, or kill of protected wildlife, like the pygmy-owl, they provide no protection to their habitats.

Protections in Mexico

Within Mexico, the distribution of owls is large and includes multiple States. The administration of land use in Mexico depends on the national government, which

implements Natural Protected Areas and other Federal programs, and also the policies of each State and even municipal governments (Enríquez 2021, pers. comm.). This system represents a wide range of management, conservation, and natural resource use approaches that affect pygmy-owl conservation, resulting in inconsistent policies and inconsistent implementation of conservation activities. No laws or regulations in Mexico specifically protect pygmy-owls and pygmy-owl habitat. Further complicating the conservation of the pygmy-owl in Mexico is the sheer diversity of entities involved in managing land use in Mexico, each with its own mission, goals, and objectives, many of which are not related to natural resource conservation. Thus, development and application of regulations and land-management activities that promote the conservation of pygmy-owls in Mexico is difficult and exceedingly complicated (Enríquez 2021, pers. comm.).

Conservation Efforts

Cactus ferruginous pygmy-owl conservation activities have occurred sporadically over the past three decades in both the United States and in northern Sonora in Mexico. Initial conservation efforts developed effective and safe protocols for studying the cactus ferruginous pygmy-owl and on gathering basic life-history information. Efforts expanded in the late 1990s and early 2000s to include important pygmy-owl work in Arizona, Texas, and northern Sonora. For the past two decades, studies have been irregular and focused primarily on monitoring known territories, although work continues on the pygmy-owl captive-breeding pilot project, as described below.

Surveying and Monitoring

AGFD initiated surveys to determine the extent of cactus ferruginous pygmy-owl occurrences in Arizona in 1992, when the cactus ferruginous pygmy-owl was first petitioned to be listed under the Act. Survey and monitoring work by a variety of entities continued through 2006, when the subspecies was delisted. Prior to delisting, survey and

monitoring efforts were focused within Pima and Pinal Counties to document the occupancy pattern of cactus ferruginous pygmy-owls in areas of land use changes, primarily urban development. After the pygmy-owl was delisted in 2006, Service and AGFD biologists continued to conduct a small number of monitoring surveys. In 2020, AGFD coordinated a comprehensive survey effort within the recently occupied areas of Arizona, with the help of numerous partners, to gather data on the current abundance and distribution of the cactus ferruginous pygmy-owl in Arizona to inform this listing decision. Specifically, this effort included surveys to document distribution, territory occupancy monitoring, and some nest searches to document reproduction. This latest effort provided data on current distribution of the pygmy-owl in Arizona and the number of occupied territories, as well as some information on the number of active nesting territories (Ingraldi 2020, pers. comm.; AGFD 2021b, pers. comm.). These data are incorporated into the SSA report. However, these efforts did not provide any information on productivity or survival at these sites. Despite the changing regulatory environment and inconsistent availability of resources, survey and monitoring activities provide important information on the abundance and distribution of pygmy-owl across its range and, with that information, managers can more effectively and efficiently work to conserve the pygmy-owl.

Nest Box Trials

Because cactus ferruginous pygmy-owls are secondary cavity nesters (birds that nest in cavities excavated by other bird species), the number of available cavities may influence the viability of cactus ferruginous pygmy-owls on the landscape (Proudfoot 1996, p. 68). Using nest boxes as a management tool may enhance the viability of cactus ferruginous pygmy-owls by increasing cavity availability and reducing predation. Nest boxes also enhance access to the owls during nesting, which facilitates research. Research in Texas demonstrated successful use of artificial nest structures by cactus ferruginous

pygmy-owls (Proudfoot et al. 1999, pp. 5–6). In response to concerns about cavity availability, two nest box trials were conducted in Arizona in 1998 and 2006. No cactus ferruginous pygmy-owls used the nest boxes in these studies, but low cavity availability was confirmed based on high use of the nest boxes by other species, including screech owls. No additional nest box studies have been undertaken in Arizona, and the nest box study in Texas is no longer active. The information on nest box use in Texas has contributed to the conservation of the pygmy-owl in Texas. Additional research is needed in other parts of the pygmy-owl's range to understand the effectiveness, or lack thereof, of using nest boxes as a conservation tool for pygmy-owls.

Captive-Breeding and Population Augmentation

The AGFD initiated a pygmy-owl captive-breeding feasibility study in partnership with the Wild at Heart raptor care facility in Cave Creek, Arizona, in 2006. Since then, Wild at Heart has researched and tested protocols for a managed breeding program for cactus ferruginous pygmy-owls. In 2017, the Phoenix Zoo became the second captive-breeding site for pygmy-owls in Arizona and part of the managed breeding program when it entered into partnership with the Service and the AGFD. Both the AGFD and the Service oversee this program.

The goal of the managed breeding program for the cactus ferruginous pygmy-owl is to develop appropriate protocols for the husbandry and breeding of captive pygmy-owls to provide individuals to augment existing population groups or establish new population groups in areas where suitable habitat exists in Arizona (AGFD 2015, entire). To date, these efforts have demonstrated: (a) Successful capture and transport of wild cactus ferruginous pygmy-owls; (b) safe, healthy, and stress-free captive facilities; (c) the development of appropriate care, feeding, and maintenance protocols; (d) successful breeding; and (e) appropriate care and development of young-of-the-year birds. Three pilot releases of captive-bred pygmy-owls have been implemented since the inception of

this program. This effort establishes the first formal captive-breeding for the subspecies and provides the groundwork for evaluation of this strategy in wild cactus ferruginous pygmy-owl population augmentation. These pilot releases have not resulted in the establishment of new pygmy-owl territories or population groups, but they have contributed valuable information to developing appropriate release strategies and protocols to improve the potential for conservation benefits to the pygmy-owl in the future. For example, high mortality rates of released captive-bred pygmy owls as a result of weather, prey availability, predation, habitat conditions, and lack of pre-release conditioning all likely contributed to past failures. However, an adaptive management approach is being used to address such mortality factors and improve methodology. The partners involved in this project are committed to the continuation of this effort into the future.

Conservation Planning

When the pygmy-owl was listed previously, several municipalities located within current or historical pygmy-owl activity areas explored or implemented habitat conservation plans (HCPs) under the Act to address potential conflicts between development projects and requirements of the Act. These HCP plans included the Sonoran Desert Conservation Plan (Multi-Species Conservation Plan) developed by Pima County (Pima County 2016, entire), the Town of Marana HCP (Town of Marana 2009, entire), and the City of Tucson's Avra Valley (City of Tucson 2019, entire) and Southlands HCPs (City of Tucson 2013, entire). Each of these four HCP efforts identified the cactus ferruginous pygmy-owl as one of the covered species within their plans. However, most of these plans have yet to be completed: to date, only the Pima County HCP has been completed and implemented. Pima County is currently conducting ongoing surveys and monitoring of pygmy-owl territories on county-managed lands and has set aside pygmy-owl habitat as part of their conservation-lands system in compliance with

their HCP. The establishment of these conservation lands is an important contribution to pygmy-owl conservation in Pima County, but continuing efforts are needed to address other threats such as habitat impacts from climate change. Pima County's efforts are expected to continue for the 30-year life of their permit (through 2046) and longer if the County renews the permit.

Another ongoing conservation planning effort that has the potential to support pygmy-owl conservation in the Altar Valley of southern Arizona is the Altar Valley Watershed Management Plan. This plan (being developed by the Altar Valley Conservation Alliance with numerous partners and participants) builds upon existing efforts within the Altar Valley to restore and enhance the watershed. The plan will describe stewardship practices and identify a series of high-priority projects that maximize positive impacts on the land. Projects related to watershed restoration have already been implemented at three ranches in the Altar Valley. These projects have included one-rock dams and other structures to stabilize waterways, road grading to promote water harvesting, and enhancement of grasslands through invasive species control to promote infiltration and reduce runoff and sedimentation. These actions improve vegetation health through increased water infiltration and reduced loss of soil and vegetation due to erosion. These benefits improve riparian vegetation along drainages enhancing pygmy-owl habitat conditions and connectivity. Ranches within the Altar Valley of southern Arizona have maintained open space and contributed to the conservation of pygmy-owls for over 20 years. Overall, the conservation planning efforts implemented to date have contributed to the conservation of the pygmy-owl through protecting or enhancing important pygmy-owl habitat in Arizona and providing a path towards long-term habitat viability and maintenance.

In Mexico, Federal, State, and municipal protected areas comprise approximately 11 percent of the historical pygmy-owl range in Mexico. These areas can work well as

conservation strategies for the cactus ferruginous pygmy-owl. There is now a new option for protected areas called Voluntary Conservation Areas (Áreas Destinadas Voluntariamente a la Conservación; ADVA), which are areas identified for conservation. These ADVA could be a potential conservation strategy for the pygmy-owl in the future with improved design, management, and enforcement (Burquez and Martinez-Yrizar 1997, p. 378; Valdez et al. 2006, p. 272; Burquez and Martinez-Yrizar 2007, p. 546; Enríquez 2021, pers. comm.).

Summary of Comments and Recommendations

In the proposed rule published on December 22, 2021 (86 FR 72547), we requested that all interested parties submit written comments on the proposal by February 22, 2022. We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. Newspaper notices inviting general public comment were published in the Arizona Daily Star and Corpus Christi Caller-Times. We held a public hearing on January 25, 2022. All substantive information received during comment periods has either been incorporated directly into this final determination or is addressed below.

Peer Reviewer Comments

As discussed in **Peer Review** above, we received comments from three peer reviewers. We reviewed all comments we received from the peer reviewers, including comments on substantive issues and new information contained in the SSA report. The peer reviewers generally concurred with our methods and conclusions, and provided additional information, clarifications, and suggestions to improve the final SSA report. Peer reviewer comments are addressed in the following summary and were incorporated into the final SSA report as appropriate.

(1) *Comment:* One peer reviewer commented that the construction of the border wall will cause substantive ecological damage and function as a barrier to many

terrestrial animals. However, the peer reviewer finds the idea that the border wall would be an impediment or barrier to pygmy-owls to be unfounded.

Our response: No studies have specifically looked at how border walls and associated infrastructure may affect pygmy-owl movements. We do not currently know if these structures will be a barrier or an impediment on pygmy-owls. However, observations in the field indicate that barriers similar to the border wall may affect pygmy-owl movement patterns. Pygmy-owl flight patterns are generally less than 30 m (100 ft) and typically only 1.5 to 3.0 m (5 to 11 ft) above the ground (Flesch and Steidl 2007, p. 35; AGFD 2008, pers. comm.). Flesch et al. (2010, pp. 7–9) show that the vegetation gaps, in association with the tall fences, may limit transboundary movements by pygmy-owls. The fences and vehicle barriers along the border, when considered in conjunction with patrol roads, drag roads, and vegetation removal, result in a combination of unvegetated area with a raised structure in the middle causing an impediment to pygmy-owl movement. Observations reported in the literature show that pygmy-owls avoid crossing open areas associated with roadways (Abbate et al. 1999, p. 54; Flesch and Steidl 2007, pp. 6–7; Flesch 2017, p. 5; Flesch et al. 2017, entire; Flesch 2021, pp. 12–14). Given other known impediments to pygmy-owl movements, it is likely border infrastructure could affect cross-border movements by pygmy-owls, at least at some border locations. The SSA report discusses factors that logically could result in some impact to pygmy-owl cross-border movements. However, pygmy-owls are capable flyers and easily navigate small openings in their normal day-to-day behaviors. Pygmy-owls are sometimes observed very high in trees, at or above the height of border infrastructure. Therefore, the border wall itself may not affect all cross-border movements, depending on the crossing site characteristics. However, the border wall in conjunction with lighting, patrol and interdiction activities, and vegetation clearing present more factors potentially deterring pygmy-owl movements. This issue needs more

research and monitoring to determine whether and how such border infrastructure affects pygmy-owl movements.

(2) *Comment:* A peer reviewer expressed concern in considering the eastern and western populations to be the same subspecies. The peer reviewer expressed concerns about considering each of these to be redundant populations because, with no evidence of interchange between the two populations, each population would be unable to provide rescue to the other population.

Our response: This issue was investigated by Proudfoot et al. (2006a, entire; 2006b, entire) and König et al. (1999, entire), who concluded the eastern and western populations may comprise two separate subspecies. This information, in combination with the historical descriptions of distributions for the subspecies *cactorum*, as discussed in the SSA report, provided some general evidence that reclassification of this subspecies could have merit. However, after reviewing the best available information, we find that the evidence of delineating the range of these subspecies is uncertain and inconsistent. Peer reviewers of our 2011 12-month finding pointed out that a combination of factors, including morphological, vocal, and genetic, need to be considered in greater depth, with additional sampling and analysis of existing samples, to determine if the petitioned taxonomic classification should be accepted, and we are in agreement with these comments.

Given the uncertainty and lack of clarification found in the best available scientific and commercial information, we rely on the “biological expertise of the Department and the scientific community concerning the relevant taxonomic group” (50 CFR 424.11(a)) and the “standard taxonomic distinctions (50 CFR 424.11(a)). Additional genetic sampling and analysis in 2021 through AGFD, while providing additional samples and an updated analysis of Proudfoot et al.’s (2006a, entire, and 2006b, entire) work, did not provide compelling evidence to change our conclusions regarding the

taxonomic classification of the cactus ferruginous pygmy-owl (Cobbold et al. 2022b, entire) (see also **Background** above). We do not yet have enough information to say whether pygmy-owls at the far ends of their distribution (Texas and Arizona) represent different subspecies, but the work by Cobbold et al. (2022b, entire) suggests there is likely some degree of redundancy between the eastern and western populations of the pygmy-owl at the southern end of the range. In other words, cactus ferruginous pygmy-owls in the southern portion of the range are more similar to each other than to pygmy-owls in the northern extremes of the range in Arizona and Texas. See also our response to comment 8 below.

(3) Comment: One peer reviewer pointed out that the influence diagram in the SSA report (figure 4.1) was missing some linkages and suggested careful consideration of additional linkages that may need to be added.

Our response: We acknowledge that there are numerous other connections not shown in the influence diagram in the SSA report. However, we have simplified the graphic to illustrate the most important influences on the subspecies. We have added the two additional connections suggested by the reviewer and added clarification in the SSA report acknowledging the complicated and interconnected nature of stressors, habitat, individuals, and population resiliency.

Federal Agency Comments

(4) Comment: The Forest Service stated that a critical habitat designation would help to define areas in which to restrict wood harvesting within the Coronado National Forest.

Our response: We will be publishing a proposed rule to designate critical habitat as a separate action and will solicit public comments on the critical habitat designation at that time. Our intent is to publish a proposed critical habitat rule within 1 year of this final listing rule.

Comments from States

(5) Comment: The Arizona Department of Forestry and Fire Management and the Arizona Department of Transportation expressed concerns about prohibitions on prescribed fire in the Sonoran Desert and thinning of woody plants, specifically as it relates to fire management, invasive species management, and for public safety along roadways. The Arizona Department of Transportation requested that vegetation management and brush removal within the recovery zone of roads and other strategic locations be included as an exception in the 4(d) rule.

Our response: We acknowledge and understands the importance of managing vegetation strategically along roadways and for fire and invasive species management that can promote the conservation of native species and their habitats. However, a broad exception under a 4(d) rule for such activities would prevent us from working with partners to conduct these activities in a way that minimizes effects to the pygmy-owl and its habitat. The design of projects such as these are dependent upon a number of site-specific factors requiring unique recommendations and approaches so that pygmy-owl-specific measures can be incorporated. We have a number of tools in place to reduce consultation workloads for action agencies, including programmatic consultations, which would allow for strategic planning of vegetation projects while allowing adequate planning and review. We look forward to the opportunity to work collaboratively with partners in Arizona and Texas to help conduct necessary vegetation management projects while also ensuring that effects to listed species are considered and minimized.

(6) Comment: The Texas Parks and Wildlife Department (TPWD) and Arizona Department of Transportation requested increased clarification for which habitat restoration projects would be excepted under the 4(d) rule.

Our response: We have provided additional clarity for which habitat projects are excepted under the 4(d) rule and which would require a section 7 consultation. This additional clarification can be found under **Provisions of the 4(d) Rule** below.

(7) Comment: The TPWD requested additional information regarding the potential to use the State permitting process for surveying and monitoring activities.

Our response: Discussion of this issue with TPWD has revealed they are only authorized to permit activities that involve direct handling of protected species, and, therefore, they do not permit the types of activities excepted under the 4(d) rule for pygmy-owls, according to Texas State Parks and Wildlife Code (Sec. 43.021). For this reason, we will still require a Federal section 10 permit for pygmy-owl activities in Texas.

(8) Comment: The Texas Comptroller of Public Accounts and the AGFD questioned the validity of the subspecies' taxonomy and stated that the Service should first address the taxonomic uncertainty prior to making a listing decision.

Our response: As discussed in **Background** and *Peer Reviewer Comments*, above, and extensively in the SSA report (Service 2022a, Section 2.1–2.2), we rely on the currently accepted taxonomy when making listing decisions. Although there have been proposed revisions to the pygmy-owl taxonomy, these revisions have not been accepted by the American Ornithological Society, the recognized authority for avian taxonomic classification. Therefore, we have analyzed the cactus ferruginous pygmy-owl as currently described (*Glaucidium brasilianum cactorum*).

(9) Comment: The Texas Comptroller of Public Accounts stated that pygmy-owl habitat in Texas makes up only five percent of the range of the subspecies and that the population there is most likely secure. They also state that the population in Texas is greater than that of Arizona.

Our response: When analyzing the status of a species throughout its range, we do not focus only on the portions of the species' range within one State. Therefore, the percentage of the range within each State in a species' range is not directly relevant to its status throughout its range. We agree that the population in Texas is likely greater than that in Arizona and have acknowledged that fact in this rule. Although populations in one State may be higher than another, we analyze the status of the species throughout all or a significant portion of its range when making listing decisions. We rely on the current and future conditions, and the threats and stressors acting on the species and its habitat, to determine whether or not a species is in danger now or likely to become endangered in the foreseeable future throughout all, or a significant portion of its range, not within each State in which it occurs. Although pygmy-owls in Texas still occur within rural private lands, much of the range of the pygmy-owl in Texas has been developed and connectivity to Mexico has been significantly reduced. The pygmy-owl has been listed as a Species of Greatest Conservation Need by TPWD since 2005, and in 2020, TPWD downgraded the ranking of the subspecies from vulnerable to imperiled. TPWD, the State authority for managing the wildlife in Texas, was closely involved in the development of the SSA for the pygmy-owl and provided data for this species in Texas. For these reasons, we do not conclude that the species is secure in Texas for the foreseeable future.

(10) Comment: The Texas Comptroller of Public Accounts stated that the information used in the SSA report may have been best available but was incomplete and outdated. They stated that the Service should not make a listing decision without robust population and habitat data.

Our response: When making listing decisions, we are required to rely on the best available information. The Act does not require that we conduct our own research and monitoring before making a listing determination. Often, we are required to make listing decisions based on incomplete or outdated information, as many of the species we

analyze are rare and it is difficult to get adequate sample sizes for study or analysis. For these reasons, many of these species are not thoroughly studied. We do not delay providing protections to species while awaiting additional data and, while we would welcome new information not included in our SSA report, to date our analysis includes the best available information for the pygmy-owl.

(11) Comment: The AGFD and other commenters stated that the Service did not provide adequate support linking projected future human population growth to direct effects to the status of the pygmy-owl. The commenters stated that the Service needed direct information related to the subspecies' status before, during, and after this human population growth to demonstrate an effect to the subspecies.

Our response: We acknowledge that we do not have an extensive set of quantified empirical data for a detailed analysis of the effects of urbanization and development on pygmy-owls and pygmy-owl habitat. There have been no specific studies quantifying the effects to pygmy-owls and their habitat from urban development. However, as presented in Appendix 6 of the SSA Report (Service 2022a, Appendix 6), the data we have indicate that substantial areas of habitat within the range of the pygmy-owl have been lost due to urban growth and development (approximately 100,000 acres cumulatively in the Arizona and Texas analysis units over the past 10 years), and it is reasonable to predict that such loss will continue as population growth and development patterns trend upward into the future and more suitable habitat is converted for urban development. We used the best available information on population growth and development projects to project potential losses of pygmy-owl habitat into the future.

Additionally, in response to a comment we received during the public comment period, we completed additional analysis on land cover changes within pygmy-owl habitat in Texas and Arizona over the past decade (2010–2020). The commenter provided an analysis on changes in land cover within the pygmy-owl analysis areas during the time

period of 2010–2015 and suggested that the impacts to pygmy-owl habitat were not as great as we presented in the proposed rule and SSA report. The commenter’s data sources were different than what we used in the SSA, but the commenter presented a reasonable issue with regard to the data presented. Because it is important to consider the scope, scale, and the factors included in different sources of data, we conducted additional analysis using data sources that provided the same type of data that the commenter used in their analysis. This allowed us to compare the results of additional sources of data with the results presented by the commenter. This additional analysis provides different results than presented by the commenter, but this outcome is expected because of differing time periods, categories of land cover and land use, and the scope and scale of the data.

Both analyses provide useful information to consider as we evaluate the status of the pygmy-owl. Neither analysis changed the outcome of our listing decision or our assessment of the effects of human population growth on the pygmy-owl. Our analysis showed greater impacts to pygmy-owl habitat than the data provided by the commenter and supported our finding that some areas of pygmy-owl habitat have been lost or modified and habitat fragmentation has continued, at least in Texas and Arizona, during this time period. Our further analysis related to the impacts of various land uses on pygmy-owl habitat over the past decade can be found in appendix 6 of the SSA report (Service 2022a, appendix 6).

(12) Comment: The AGFD claimed that agricultural development should not be considered a current threat to the pygmy-owl in Arizona as the effects of agricultural development occurred primarily historically.

Our response: Agricultural development was primarily a historical threat to the distribution of pygmy-owls in Arizona (Stromberg 1993, pp. 117–119; Jackson and Comus 1999, pp. 215–255). However, agricultural development is still a local impact to pygmy-owls in Arizona and is impacting habitat connectivity and pygmy-owl movements

in some parts of Arizona, primarily in Pima and Pinal Counties (Service 2022a, Appendix 6). Additionally, agricultural development is currently resulting in ongoing pygmy-owl habitat loss and fragmentation in Texas and in all the analysis units in Mexico. The best available information indicates it is a current and projected threat to pygmy-owl habitat.

Public Comments

(13) Comment: One commenter stated that the Service did not explain why the proposed 4(d) rule was not analyzed under the National Environmental Policy Act.

Our response: As stated under *National Environmental Policy Act* (42 U.S.C. 4321 *et seq.*) below and in the proposed rule, regulations adopted pursuant to section 4(a) of the Act are exempt from the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq.*) and do not require an environmental analysis under NEPA. We published a notice outlining our reasons for this determination in the *Federal Register* on October 25, 1983 (48 FR 49244). This includes listing, delisting, and reclassification rules, as well as critical habitat designations and species-specific protective regulations promulgated concurrently with a decision to list or reclassify a species as threatened. The courts have upheld this position (*e.g., Douglas County v. Babbitt*, 48 F.3d 1495 (9th Cir. 1995) (critical habitat); *Center for Biological Diversity v. U.S. Fish and Wildlife Service.*, 2005 WL 2000928 (N.D. Cal. Aug. 19, 2005) (concurrent 4(d) rule)).

(14) Comment: Two commenters stated that grazing is not beneficial nor adequately managed and should not be included in the 4(d) rule.

Our response: As discussed in the proposed rule, we considered mechanisms to ensure livestock grazing is conducted in a manner that promotes the conservation of the pygmy-owl. While developing our proposed rule, we determined that livestock grazing requires local management that can address the specific conditions of each individual operation and, therefore, including a broad, general exception for grazing within the 4(d) rule would not be beneficial to the subspecies. We are not currently allowing any

exceptions from section 9 prohibitions for livestock grazing. Therefore, future livestock grazing actions with a Federal nexus that may affect the pygmy-owl will require a section 7 consultation with the Service.

(15) Comment: One commenter requested clarification of the phrase “accelerate the time horizon” that was used in our discussion of the concentration of threats within the Sonoran Desert Ecoregion.

Our response: To provide additional clarity, we have removed the statement “accelerate the time horizon” from our discussion in *Status Throughout a Significant Portion of Its Range* below. In summary, we found that the Sonoran Desert Ecoregion has a concentration of threats to the pygmy-owl; however, we determined that these threats did not rise to the level of those that would place the pygmy-owl in danger of extinction now in that portion of its range. Therefore, we determined that the pygmy-owl’s status within the Sonoran Desert Ecoregion is the same as the rangewide status of threatened.

(16) Comment: One commenter stated that the Service did not conduct a regulatory flexibility analysis for the 4(d) rule to determine if the proposed action would affect small entities. The commenter stated that the issuance of a 4(d) rule is a distinct regulatory action from the listing of a species under section 4(a) of the Act.

Our response: In 1982, Congress added to the Act the requirement that classification decisions be made “solely on the basis of the best scientific and commercial data available.” In addition, the Conference Report accompanying those amendments made clear that one purpose of adding that language was to ensure that requirements like those in E.O. 12866 do not apply to classification decisions. Specifically, it states that economic considerations have no relevance to determinations regarding the status of species and the economic analysis requirements of Executive Order 12291 [the predecessor of E.O. 12866], and such statutes as the Regulatory Flexibility Act and the Paperwork Reduction Act, will not apply to any phase of the listing process. H.R. Conf.

Rep. No. 97-835, at 20. Section 4(d) requires that the Service issue regulations deemed necessary and advisable to provide for the conservation of a species whenever any species is listed as a threatened species. We consider this 4(d) rule to be a necessary and advisable phase of the listing process to put in place protections for this threatened species.

(17) Comment: Two commenters stated that the proposed rule did not explain the need to extend all section 9 prohibitions for endangered species to the pygmy-owl and did not adequately explain why the 4(d) rule was necessary and advisable.

Our response: As discussed in **Final Rule Issued Under Section 4(d) of the Act** below, in promulgating regulations under section 4(d) of the Act, we have broad discretion to select appropriate provisions tailored to the specific conservation needs of threatened species. The second sentence of section 4(d) states that the Secretary “may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1), in the case of fish or wildlife, or 9(a)(2), in the case of plants.” The use of the word “may,” along with the absence of any specific standards, in the second sentence grants us particularly broad discretion to put in place prohibitions with respect to threatened species that section 9 prohibits with respect to endangered species. We have found that in most cases, it is necessary and advisable to apply to a threatened species: (1) all of the general prohibitions that apply to endangered species under section 9 and then (2) tailor the exceptions to those prohibitions to address the specific conservation needs of the species. We often lack a complete understanding of the causes of a species’ decline and affording a threatened species protections that are similar to the protections for an endangered species should help provide the necessary tools over time as we learn more about the species’ status and threats. In this instance, we have determined that it is necessary and advisable to extend all section 9 prohibitions to the pygmy-owl (see **Final Rule Issued Under Section 4(d) of the Act** below) and that doing so accomplishes our

goal of putting in place protections that will both prevent the species from becoming endangered and promote its recovery. As new information becomes available, we have the option to revise species-specific rules accordingly.

(18) Comment: We received several comments pertaining to critical habitat designation for the pygmy-owl.

Our response: We are working on a proposed critical habitat rule and will address comments pertaining to critical habitat designation during the public comment period for that proposed rule.

(19) Comment: Two commenters stated that a court determined the Service's interpretation of the phrase "significant portion of its range" was unlawful (*Ctr. For Biological Diversity v. Jewell*, 248 F. Supp. 3d 946 [D. Ariz. 2017]; 248 F. Supp. 3d at 955-58), and in the vacatur and remand of the 2011 pygmy-owl finding (76 FR 61856, October 5, 2011), the court's ruling addressed only the "significant portion of the range" policy and that, on remand, the Service did not need to address any other aspect of the 2011 finding.

Our response: The court's decision in 2017 vacated and remanded the entire 12-month finding. Additionally, in the 10 years since our previous decision, there has been new information, as outlined in **Summary of New Information Since 2011 Finding**. Therefore, we were required to revisit our previous finding and assess all new information to ensure we are making a listing determination based on the best available information.

(20) Comment: Two commenters indicated that the Service included no information regarding recent, specific rangewide habitat losses that would cause pygmy-owl habitat conditions to have declined since the 2011 12-month finding.

Our response: As discussed in the SSA report (Service 2022a, chapter 7) and clarified in this rule, substantial new information on the status of the pygmy-owl has

become available since our 2011 finding. Our analysis shows that, while the same threats may not be occurring in all analysis units, every analysis unit within the range of the pygmy-owl is experiencing ongoing threats. Threats in each analysis unit have resulted in past pygmy-owl habitat loss and are likely to result in additional pygmy-owl habitat loss and fragmentation into the future. It would not be reasonable to conclude that ongoing threats to habitat that demonstrably caused habitat losses in the past are not continuing to cause habitat losses now and into the foreseeable future. Additionally, we updated the threats section based on references and comments provided during the public comment period and on updated references found while developing our response to comments. Thus, we used the best available information to determine that, while most rangewide habitat losses are not caused by a single threat, the combination of threats in all analysis units results in rangewide impacts to pygmy-owl habitat.

(21) Comment: Two commenters interpreted the information found in the SSA report and proposed rule as indicating that pygmy-owl population estimates are greater in the proposed rule and SSA report than in the Service's 2011 12-month finding (76 FR 61856, October 5, 2011).

Our Response: The population estimates to which the commenters referred (Service 2022a, table 4.2) are not actual population estimates but, rather, an estimate of the general magnitude of pygmy-owl abundance within each analysis unit. Thus, these estimates of the magnitude of abundance in the SSA should not be interpreted as precise population estimates, but rather as a tool to compare the general abundance of pygmy-owls in each analysis unit. As explained in the SSA report, we lack actual, quantitative pygmy-owl abundance data, even in those analysis units where some survey and monitoring activities have occurred. The actual abundance of pygmy-owls is unknown for every analysis unit, particularly for the western Mexico and northeastern Mexico analysis units. However, the best available information indicates that abundance,

distribution, or both have declined in the three analysis units where survey and monitoring data do exist (Arizona, Texas, and Northern Sonora), and anecdotal information suggests this is true for the other analysis units in Mexico. We have clarified this point in the SSA report (Service 2022a, Section 6.2) and this final rule (see *Summary of Current Condition of the Subspecies*).

(22) *Comment:* Several commenters pointed out that listing the pygmy-owl is not warranted because nearly 90 percent of the pygmy-owl's range is in Mexico, where the subspecies is considered common and faces few serious threats.

Our response: While the majority of the pygmy-owl's overall geographic range is found in Mexico, the owls and owl habitat in the United States contributes to the viability of the subspecies as a whole, and it is on the overall viability of the subspecies that we make listing determinations. We used the best available information to estimate the magnitude of pygmy-owl abundance; while we estimate that the pygmy-owl occurs in higher densities in the western Mexico and northeastern Mexico, we have the least information on pygmy-owl abundance and density from these areas of the range. Additionally, the pygmy-owls in those regions face a number of serious threats, such as urbanization, deforestation, and climate change. As described in the SSA report (Service 2022a, entire) and this final rule, we find that the best available information supports our finding that, while the threats may vary across the range of the pygmy-owl, there are substantial threats affecting the pygmy-owl's viability in all five of the described analysis units, including the three analysis units found in Mexico.

(23) *Comment:* Two commenters stated that pygmy-owls in Arizona should be listed as endangered, either due to a significant portion of the range in Arizona being endangered or as a distinct population segment (DPS). One commenter believed that the population in Arizona is isolated from Sonora and may be discrete. They also stated that Arizona should qualify as a DPS due to its unusual ecological setting.

Our response: There are innumerable ways to divide up a species' range; however, we only analyze configurations that we find may meet the definition of a DPS or a significant portion of the range. We analyzed multiple potential configurations for both a significant portion of the range and DPS but discussed in the proposed rule only those that we felt were reasonable under our policy and guidance.

We determined that Arizona does not constitute a significant portion of the range of the pygmy-owl because it makes up only 12 percent of the total pygmy-owl range, contains a small proportion of the total number of pygmy-owls, and contains a similar habitat to that found elsewhere in the range. See *Status Throughout a Significant Portion of Its Range* for our full analysis.

We also found that Arizona is not a valid DPS. Under our DPS policy, a population must be both discrete and significant to be considered a DPS. We agree that under our DPS policy (61 FR 4722, February 7, 1996) the pygmy-owl in Arizona would likely meet the discreteness condition through the presence of the international border. However, the Arizona population of pygmy-owls does not meet the significance requirement. Under this condition, we assess the biological and ecological significance of the population and can consider, among other factors, a population segment in an ecological setting unusual or unique for the taxon, evidence that the loss of the discrete population would result in a significant gap in the range, evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range, or evidence that the discrete population segment differs markedly from other populations of the subspecies in its genetic characteristics. There is no evidence that the Arizona population is genetically separate from the remainder of the range. This population does not occur in a unique or unusual setting as it has a similar ecological setting to habitat in Northern Sonora, comprising primarily Sonoran Desert vegetation. The loss of the

Arizona population would create a gap in the range of the pygmy-owl, but not a significant one. Because this population is on the northern extreme of the pygmy-owl range, the gap that would result would be on the periphery of its range. While the court acknowledged the presence of this gap in the range, it found that this gap would not be significant to the species as a whole and we agree based on the best available data. In looking at the best available data and considering the pygmy-owl population segment in Arizona, we determined that it does not meet the significance condition of our DPS policy. For additional discussion of our DPS analyses see, *Distinct Vertebrate Population Segment* below. For an in-depth discussion of the DPS analysis for Arizona, see also our final rule to delist the Arizona DPS of the pygmy-owl (71 FR 19452, April 14, 2006).

(24) *Comment:* We received several comments stating the pygmy-owl is endangered in the Sonoran Desert ecoregion, which constitutes a significant portion of the range of the pygmy-owl. One commenter stated that the Service should have analyzed the eastern and western populations of the pygmy-owl as a DPS, and we should have then found the Sonoran Desert was a significant portion of the range of the western DPS.

Our response: To clarify our analysis of whether it would make sense to separately analyze a potential eastern and western population DPS, we have added additional discussion under *Analysis of Potential Distinct Population Segments*, below. Although the Sonoran Desert ecoregion is a unique ecological setting, this region does not have a different status from the rest of the range. We have determined that the subspecies is in danger of extinction in the foreseeable future throughout its range. Therefore, when examining the populations in the Sonoran Desert Ecoregion, we looked to determine if this region had a different status from the rest of the range. The Sonoran Desert Ecoregion currently supports an abundance of pygmy-owls in the high hundreds and a moderate amount of intact, suitable vegetation (Service 2022a, chapter 6). Consequently, these factors are currently maintaining an overall moderate level of

resiliency in this portion of the range. There is currently habitat connectivity with evidence of pygmy-owl movement among population groups, providing redundancy throughout the Sonoran Desert Ecoregion. Representation is currently being maintained through pygmy-owl occupancy of a variety of vegetation types throughout the Sonoran Desert Ecoregion with gene flow among these population groups. Although threats may be more concentrated in this region, this ecoregion is not in danger of extinction now, but is likely to become so in the foreseeable future and has the same status as the rest of the range. Therefore, we determined that, although the Sonoran Desert ecoregion has a concentration of threats and *may* constitute a significant portion of the range, the population of pygmy-owls there is not currently in danger of extinction and has the same status as the subspecies rangewide. When assessing a potential significant portion of the range, we can choose to first address the question of whether a portion has a different status than the species rangewide or whether a portion is significant. In this instance, we addressed the status question first and determined that the Sonoran Desert Ecoregion does not have a different status than the subspecies rangewide and, therefore, did not need to move on to address the question of significance of this portion. For additional discussion of our analyses see *Status Throughout a Significant Portion of Its Range* and *Distinct Vertebrate Population Segment* below.

(25) *Comment:* Several commenters stated they believed the pygmy-owl in the Sonoran Desert Ecoregion met the criteria for a DPS.

Our response: Our policy (61 FR 4722, February 7, 1996) requires that a DPS be markedly separate from other populations of the same taxon. There are no physical, geographic, or behavioral barriers that separate the petitioned Sonoran Desert DPS from the rest of the pygmy-owl's range to the south. Although there may be some impediments to movement in central Sonora, this situation does not prevent movements of pygmy-owls between northern and southern Sonora. Genetic differentiation is a result of

isolation by distance. This finding is supported by genetic sampling (Cobbold et al. 2022b, entire; Proudfoot 2006a, entire). The Sonoran Desert Ecoregion does differ ecologically from the remainder of the areas within its range. However, as described above and in *Distinct Vertebrate Population Segment* below, the best available scientific and commercial data do not indicate that this ecological difference has resulted in any morphological, physiological, or genetic differentiation within pygmy-owl populations in the Sonoran Desert and that these populations are not markedly separated from populations to the south.

(26) *Comment:* One commenter requested that the Service clarify and justify criteria used to make decisions pertaining to distinct population segments and a significant portion of the range. Specifically, the commenter mentioned our discussion of the Sonoran Desert as a potential DPS whereby we assert that connectivity occurs between the Sonoran Desert ecoregion and southern Sonora, as evidenced by genetic sampling. The commenter requested additional clarification on how much restriction of gene flow would be required for these populations to be considered discrete. The commenter also requested the benchmarks used to determine whether a geographical extent was significant or not.

Our response: Neither the Act nor our regulations provide or require benchmarks or thresholds for determining whether a population or portion of the range should be considered a distinct population segment or a significant portion of the range. Our DPS policy (61 FR 4722) provides guidance for analyzing areas as potential DPSs; however, we have broad discretion to make science-based decisions on a species-by-species basis, including whether to analyze specific areas as potential DPSs or significant portions of the species' range. In this instance, the best available data show that there is enough genetic exchange between the Sonoran Desert ecoregion and southern Sonora to maintain gene flow (Proudfoot et al. 2006a, entire; 2006b, entire; Cobbold et al. 2022b, entire). For

additional information on our DPS analysis, see our responses to comments 25 and 26.

Because we determined that the Sonoran Desert Ecoregion does not meet the discreteness condition of our DPS policy (76 FR 61856, October 5, 2011), we did not further analyze its significance under the policy. For additional discussion of our analyses see *Status Throughout a Significant Portion of Its Range and Distinct Vertebrate Population Segment* below.

(27) *Comment:* One commenter stated that, under the most likely future scenario in the SSA report, the increased effects scenario, there would be a high probability of extirpation within the next 30 years in portions of the subspecies' range.

Our response: Given the complexity of and the limited data available on the future influences and subspecies' responses to those influences, we did not base our listing decision on any one scenario but rather considered the range of plausible future conditions and risk to the subspecies. Although we do acknowledge that threats to the subspecies are not consistent across the range, we have determined through our DPS and significant portion of the range analyses that those areas either do not meet the criteria for a DPS or significant portion of the range, or that the species is not currently in danger of extinction in any of those areas. See comments 25, 26, 27, and *Status Throughout a Significant Portion of Its Range and Distinct Vertebrate Population Segment* below.

(28) *Comment:* One commenter stated that the Service did not apply the five-factor test required by section 4(a) of the Act but instead used the three R's principles of resiliency, redundancy, and representation.

Our response: As discussed under **Regulatory and Analytical Framework**, we are required to determine if a species is an endangered species or threatened species because of any of the five factors listed in the Act. These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. However, the mere identification of a threat under one of

these factors does not necessarily mean that a species meets the statutory definition of an endangered or threatened species. We must evaluate each threat and its expected effects on the species, and then analyze the cumulative effect of all the threats on the species as a whole. We examined the following threats to the cactus ferruginous pygmy-owl: Climate change and climate condition (Factor E), habitat loss and fragmentation (Factor A), human activities and disturbance (Factors B and E), waived or ineffective regulatory mechanisms (Factor D), human-caused mortality (Factors B and E), disease and predation (Factor C), and small population size (Factor E), and we determined that the primary threats to the subspecies are climate change and climate condition, and habitat loss and fragmentation.

The supporting Species Status Assessment (SSA) report documents the results of our comprehensive biological review of the best scientific and commercial data regarding the status of the subspecies, including an assessment of these potential threats to the subspecies. The SSA report does not represent our decision on whether the subspecies should be proposed for listing as an endangered or threatened species under the Act. In the SSA, we use the conservation biology principles of resiliency, redundancy, and representation to assess the viability of the subspecies. This biological assessment does not replace the additional application of the standards within the Act. Rather, it provides the scientific basis that informs our regulatory decisions, which involve the further application of the standards within the Act and its implementing regulations and policies. We found that, based on analysis in the SSA regarding the projected future condition of the species, the cactus ferruginous pygmy-owl is likely to become an endangered species in the foreseeable future primarily due to Factors A and E.

(29) Comment: One commenter stated that we should have used a shorter timeframe when analyzing future conditions of the pygmy-owl and suggested timeframes of 10 years and 20 years.

Our response: The Service has wide discretion when determining the appropriate timeframes when analyzing future scenarios and projecting future conditions of a species. As discussed in **Future Scenarios** above, we chose a 30-year timeframe to adequately capture natural variation and fluctuations in owl populations such as described in Flesch et al. 2017 (entire) and because it was the timeframe where we could make reasonably reliable predictions about the threats to the species.

(30) Comment: One commenter indicated that we overemphasized the effect of buffelgrass on pygmy-owls. The commenter stated that buffelgrass occurs primarily on slopes, which are not generally used by pygmy-owls.

Our response: Our analysis shows that the extent of the current distribution of buffelgrass and the rate at which that distribution is and can expand, as well as the detrimental effects to native vegetation communities, do indeed result in negative impacts to the viability of pygmy-owl populations. These impacts include loss of nest cavity substrates, reduction in woody vegetation cover, loss of habitat connectivity, and reduction in prey diversity and availability. While buffelgrass certainly seems to thrive on slopes, it also occurs on bajadas and on the valley floor in areas that support pygmy-owl habitat. The literature is clear that buffelgrass is an invasive threat to all vegetation communities that provide pygmy-owl habitat (Esque and Schwalbe 2002, p. 165; Lyons et al. 2013, p. 71; Wied et al. 2020, entire). See also Invasive Species above and the SSA report (Service 2022a, chapter 7). Thus, we did not overemphasize this effect.

(31) Comment: Two commenters stated that pygmy-owl populations in the Altar Valley in Arizona have remained relatively stable and that, since there are pygmy-owls in captivity, they are not at risk of extinction.

Our response: Listing determinations are made on the entire listable entity, rather than a single population within that listable entity. Though controlled propagation has a supportive role in the recovery of some listed species, the intent of the Act is “to provide

a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved.” Controlled propagation is not a substitute for addressing factors responsible for an endangered or threatened species’ decline and the presence of individuals of the species in captivity does not mean that a species is not in danger of extinction. Our first priority is to recover wild populations in their natural habitat wherever possible, without resorting to the use of controlled propagation. This position is fully consistent with the Act. As discussed in **Determination of Cactus Ferruginous Pygmy-owl Status** below, we have determined that the pygmy-owl is not in danger of extinction now but is likely to become so in the foreseeable future throughout its range.

(32) Comment: Two commenters felt that instead of a critical analysis of the best available data, the proposed rule relies on opinion and a subjective categorization of the future impacts of threats to the pygmy-owl. They stated that the SSA report lacks sufficient specific, relevant data that can be objectively analyzed.

Our response: As with most uncommon or rare species that the Service evaluates under our authorities, information, particularly quantitative data, is limited for the pygmy-owl. In our analysis of the status of the pygmy-owl, we used specific, quantifiable information wherever available. Where such information was not available, we relied on expert elicitation and review, as well as the best professional judgment of the biologists and scientists working on our review of the status of the pygmy-owl. Our assessment of the future impacts of threats to the pygmy-owl is based on reasonable and plausible scenarios of future climate change, habitat fragmentation and loss, conservation efforts, and the subspecies’ responses to these influences. We do not agree with the commenters’ statements that this finding relies on opinions or subjective categorization of future impacts of the threats to pygmy-owls. Instead, we based this assessment on the best scientific and commercial data available, which includes habitat data and modeling (see Service 2022a, appendices 1, 4, and 6), climate data analysis (see Service 2022a,

appendix 2), available scientific literature (see Literature Cited for Service 2022a and this final rule), and direct input from experts. We used the best available scientific and commercial data to develop plausible and representative factors and categories on which to evaluate the current condition of the subspecies, as well as future scenarios that represent a range of plausible futures. These are not speculative or subjective but based on the best available information alongside expert elicitation as described in the SSA report. Our methods for assessing the future resiliency, redundancy, and representation of the subspecies were selected given the nature of the best available information and are described in detail in chapters 6 and 8 of the SSA report (Service 2022a, chapters 6 and 8). Additionally, the pygmy-owl SSA report went through a peer and partner review process as described under **Peer Review**.

(33) Comment: Two commenters stated that the discussions of human population growth and development, and the potential for pygmy-owl habitat loss and fragmentation, were simplistic and failed to fully evaluate potential regional growth patterns and land use that influence habitat suitability for pygmy-owl.

Our response: Due to lack of specific and quantitative data on where human population growth and development would occur, we used regional growth and development projections, as these are the best available information on the subject at this time. There is much uncertainty about where future development projects will occur in the foreseeable future within the range of the pygmy-owl; therefore, it is difficult to project the specific areas of pygmy-owl habitat that will be affected. However, our analysis shows that the condition of all five analysis units will decline in the future, some to low condition, thus requiring that areas of suitable, intact pygmy-owl habitat outside of those currently occupied by pygmy-owls will be needed to maintain or improve the pygmy-owl's viability throughout its range. Therefore, understanding and considering the effects that future population growth and development will have includes not only areas

currently occupied by pygmy-owls, but also unoccupied areas of pygmy-owl habitat that will be needed to sustain future viability of pygmy-owl populations. Our approach allowed us to evaluate all areas of suitable vegetation in a consistent manner across the range of the pygmy-owl and included consideration of areas of projected human population growth across the range of the pygmy-owl.

(34) Comment: One commenter felt the Service erroneously emphasized the need for undeveloped and unfragmented habitat and provided some information suggesting that pygmy-owls appear quite tolerant of human activity, even in some of the least productive habitats within its range.

Our response: As the commenter pointed out, the best available information does include some analysis of the level of development tolerated by pygmy-owls. However, the information provided by the commenter comes from one specific population group in the Arizona analysis unit, and this population group is currently extirpated with the last detection of pygmy-owl in this population group occurring in 2006. Surveys and monitoring in this area over the past 16 years have not detected any pygmy-owls. Substantial development and habitat fragmentation have occurred in this area over this time period, reducing the potential for pygmy-owls to disperse into this area and establish home ranges in the remaining habitat. As a result, we conclude that the poor condition of this population supports our determination that pygmy-owls have limited tolerance for development and fragmentation.

Conversely, the pygmy-owl population group southwest of this population group is characterized by large areas of undeveloped habitat and reduced levels of fragmentation and has maintained, and even increased, abundance of pygmy-owls. Additionally, pygmy-owl research in northern Sonora has also shown the detrimental impacts of development on habitat occupancy by pygmy-owls (Flesch 2021, entire). Pygmy-owls can exist in areas that have a relatively low level of habitat disturbance and

development, but the presence of large blocks of nesting habitat and unfragmented dispersal corridors is necessary for the long-term viability of pygmy-owl populations and population groups. Thus, the best available information does not support the commenter's suggestion that pygmy-owls appear quite tolerant of human activity, even in some of the least productive habitats within its range.

(35) Comment: One commenter stated that the ordinal ranking scale we used for our analyses of suitable vegetation and habitat intactness did not allow for the nuances of habitat selection by individual pygmy-owls that has been observed in the field and that these analyses risk biasing the analyses towards undisturbed lands. The commenter stated that more rigorous analysis should have been conducted.

Our response: Field observations are extremely valuable in gaining insights about the life history and habitat use of a species. However, these data are sporadic and are largely unavailable across the range of the pygmy-owl. Therefore, although the information from such studies informed our models, fine-resolution data are not available at a scale that would inform a rangewide analysis of pygmy-owl habitat. As acknowledged in our SSA report (Service 2022a, section 6.1), our analyses required us to make several educated assumptions. As noted in the report, we lack specific habitat measurements related to the needs of the pygmy-owl (for example, canopy cover, tree density and height, species composition, structural diversity, patch size, and cavity availability required by the pygmy-owl) across its range. Therefore, we determined what available data sources and datasets were appropriate surrogates for pygmy-owl habitat requirements that we could apply consistently across the entire range of the pygmy-owl. Under this approach, we used the best available information in the form of remotely sensed measures of habitat metrics as surrogates for habitat characteristics needed by pygmy-owls and made reasonable assumptions based on this information. We acknowledged that these measures are not synonymous with pygmy-owl habitat, and we

refer to the areas modeled with these tools as areas of appropriate vegetation. Although we recognize that pygmy-owls may use areas with higher levels of disturbance, such as low-density urban areas, these areas do not constitute high-quality pygmy-owl habitat and do not support the long-term viability of the subspecies; therefore, we did not consider these areas suitable for pygmy-owls (see also comment 34 above). Based on information from Arizona, Texas, and northern Sonora, areas supporting larger patches of undisturbed, native woody vegetation are needed for the long-term viability of pygmy-owls (Proudfoot 1996, pp. 75-76; Abbate et al. 1999, entire; Abbate et al. 2000, entire; Flesch et al. 2015, pp. 22-26; Flesch et al. 2017, entire; Cobbold et al. 2021, entire). We are required to use the best available information when making listing decisions. The Act and existing laws and regulations do not require us to implement additional studies and research in order to fill in all the gaps in available data prior to making a 12-month finding. We cannot wait until all possible information is available as such a requirement would result in an undeterminable delay in meeting the statutory timelines and protections of the Act. Comment 34 above provides additional information related to the commenter's statement.

(36) Comment: Two commenters stated that we did not analyze data on growth and land cover change within the range of the pygmy-owl since our 12-month finding (76 FR 61856, October 5, 2011). The commenter stated that we should have analyzed this change using available remote sensing tools rather than rely on past and potential future threats.

Our response: Based on this comment, we examined the National Land Cover Dataset Enhanced Visualization and Analysis tool. Although this tool provides some measure of increases in developed areas and changes in forested areas, we found that the areas classified as forest did not adequately capture the areas used by pygmy-owls. Additionally, this tool is run at the county level, so it is difficult to see the changes to land

cover in the areas specifically used by the pygmy-owl. In our SSA report, we used the LANDFIRE dataset to analyze habitat fragmentation within the range of the pygmy-owl, which gave us specific and detailed information about where development and fragmentation had occurred within the range of the pygmy-owl (Service 2022a, appendix 1; LANDFIRE 2016, unpaginated).

We rely heavily on the scientific community to provide the data needed in making listing decisions, and we welcome new information that may inform updated SSAs, future listing decisions, and 5-year status reviews. Therefore, in response to this comment, and to be certain we have used the best available data to analyze growth and changes in land cover, we completed some additional analysis on the effects of certain land uses in Texas and Arizona over the past decade (2010–2020) on pygmy-owl habitat. This additional analysis examined land cover changes within pygmy-owl habitat over the past decade and can be found in appendix 6 of the SSA report (Service 2022a, appendix 6) (see also our response to comment 10). Although this additional analysis does not change our general determinations on changes in growth and land-use cover since 2011 or the outcome of our listing decision, it provides additional support for our finding that areas approximately 100,000 acres of pygmy-owl habitat have been lost or modified and habitat fragmentation has continued, at least in Texas and Arizona, during this time period (Service 2022a, Appendix 6).

(37) Comment: One commenter stated that our intactness model described in the SSA report was overly conservative and inappropriate for our analysis and that our usage of the 200-acre aggregated pixel size in this analysis did not account for the variation in pygmy-owl home range sizes throughout their range. That commenter also stated that we did not explain the biological criteria we used in developing the habitat intactness model, but rather it was dependent on professional judgment, and the ordinal ranking scale we used in our analysis did not allow for the nuance of habitat selection by pygmy-owls.

Our response: As mentioned previously, our analysis did not include specific, quantitative data from each analysis unit within the range of the pygmy-owl as such data is not available. Rather, we examined the available data sources and datasets to determine an appropriate surrogate for the habitat needs of the pygmy-owl that could be applied consistently across the range of the pygmy-owl. We determined that remote sensed data related to land uses and vegetation characteristic is the best available information that can be consistently applied across the range of the pygmy-owl. These data were selected based on their ability to represent the biological needs of the pygmy-owl. We based our analysis of land cover types that may support pygmy-owls on habitat selection data for Arizona, Texas, and northern Sonora (Abbate et al. 1999, entire; Abbate et al. 2000, entire; Flesch 2003, entire; Flesch et al. 2015, entire; Proudfoot et al. 2020, entire). As part of our analysis, we overlaid pygmy-owl locations with land cover data to help inform our models in both the United States and Mexico. As mentioned previously, the Act and existing laws and regulations do not require us to implement additional studies and research in order to fill in all the gaps in available data prior to making a 12-month finding.

Our models were constructed using publicly available data sets. Detailed layers are more readily available in the United States and more limited in Mexico. We attempted to maintain consistency when building models across the range of the pygmy-owl. Our approach is necessarily broad because we lack specific data regarding many of the habitat attributes needed by pygmy-owls to maintain population viability. We acknowledge that these needs and the quality of habitat vary across the large geographical range of the pygmy-owl, but local and detailed studies and research related to these local variations are lacking. The use of surrogate factors that are available to us in existing data sets results in our best possible approach to address important factors across the large and diverse geographical range of the pygmy-owl.

As we state in our SSA report, data used in our models do not completely describe all of the characteristics of pygmy-owl habitat because insufficient information is available to include all pygmy-owl habitat needs in the models. These models do not describe all aspects of pygmy-owl habitat and thus, are not reported as pygmy-owl habitat areas, but rather as appropriate vegetation areas in the SSA. However, in the absence of rangewide, habitat-suitability information, assessing the trends or conditions in these remote sensing data is useful in understanding trends in vegetation conditions affecting the pygmy-owl. In other words, changes or conditions in this context are related to the conversion of these surrogate factors into conditions that are very likely related to actual habitat quality for pygmy-owls. As discussed in this final rule, the best available data indicate that habitat fragmentation and habitat loss are threats to the viability of the pygmy-owl. Therefore, it is reasonable to conclude that developed land cover has a lower habitat quality than intact habitat.

(38) Comment: One commenter stated that the Service relied heavily on future climate change, which has a high degree of uncertainty, and that in our 2011 12-month finding we found that the Sonoran Desert would be most vulnerable to climate change and that effects to the subspecies in the remainder of the range in Mexico would be less severe or that there would be no evidence of negative impact. The commenter further stated that there is no evidence that models have become more certain since our 2011 12-month finding.

Our response: There is always uncertainty when projecting future conditions. However, we used widely accepted climate models that covered a range of plausible future climate conditions in our analysis (Service 2022a, chapters 7 and 8, and appendix 2; IPCC 2014b, entire). These models have been updated and refined since our 2011 12-month finding and are thus more accurate than those used in that listing decision (IPCC 2014b, p. 56). We find that the Sonoran Desert Ecoregion is likely the most vulnerable

portion of the pygmy-owl range to climate change effects (see *Status Throughout a Significant Portion of Its Range*). However, as discussed in *Climate Change and Climate Conditions*, as well as in the SSA report, changes to climate are anticipated to result in impacts throughout the range of the pygmy-owl.

(39) *Comment:* One commenter stated that threats are concentrated in the Sonoran Desert and that pygmy-owl abundance is not being significantly affected by those threats in the majority of the western portion of the pygmy-owl's range to the extent that the subspecies rangewide is in danger of extinction or likely to become so in the foreseeable future.

Our response: Although we agree that the Sonoran Desert Ecoregion has a concentration of threats to the pygmy-owl (see *Status Throughout a Significant Portion of Its Range*), significant threats are acting throughout the range of the pygmy-owl. The threats acting on the subspecies are discussed in depth in the SSA report and summarized in this rulemaking, and we also included a table illustrating the threats within each analysis unit (Service 2022a, chapter 7 and appendix 5).

(40) *Comment:* Two commenters indicated that the Service did not adequately explain why we found the subspecies is threatened in our current listing decision when it was determined to be "not warranted" in our 2011 12-month finding, particularly given that much of the information was the same in both documents.

Our response: In order to clarify the changes to the information and status of the pygmy-owl, this final rule includes a new section specifically outlining the new information we considered subsequent to our 2011 12-month finding (see **Summary of New Information Since the 2011 12-Month Finding**).

(41) *Comment:* Several commenters requested additional clarification on what types of actions would or would not be excepted under the 4(d) rule related to development and habitat restoration and enhancement activities. In particular, they asked

whether certain development activities, vegetation management, invasive species management, fuels management, or activities covered under a safe harbor agreement for another species would qualify for an exception under this part of the 4(d) rule, as well as specific questions related to the use of development guidelines, prescribed fire, and brush management. These commenters specifically asked that vegetation management along roadways and fuels management be included in the 4(d) rule. One commenter requested that development activities that followed certain guidelines be included in the 4(d) rule. Another commenter recommended that we consider the list of activities developed for use in the draft Programmatic Safe Harbor Agreement for the Masked Bobwhite Quail and review these activities in relation to the section 4(d) rule for pygmy-owl to provide assurance that these activities qualify as exemptions.

Our response: We have provided additional clarification to our discussion of habitat restoration and enhancement activities within the section entitled **Provisions of the 4(d) Rule**. In addition, we have included additional explanation for why the activities of development, roadway vegetation management, activities within a safe harbor agreement, fuels management, and some uses of prescribed fire are not included in the 4(d) rule. Any activities covered by the 4(d) rule should not negatively impact the pygmy-owl and should contribute to the conservation of the pygmy-owl. We acknowledge and understand the importance of managing vegetation strategically along roadways and in other areas for fire and invasive species management, and in development design and planning to promote the conservation of native species and their habitats. However, a broad exception under a 4(d) rule for such activities would prevent us from working with partners to conduct these activities in a way that minimizes effects to the pygmy-owl and its habitat. The design of projects such as these are dependent upon a number of site-specific factors requiring unique recommendations and approaches so that pygmy-owl-specific measures can be incorporated. Other regulatory approaches are

available, such as under section 7 and section 10 of the Act, and the activities and practices outlined by commenters will be appropriately considered and included during the implementation of these approaches.

Determination of Cactus Ferruginous Pygmy-owl Status

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an endangered species or a threatened species. The Act defines an “endangered species” as a species in danger of extinction throughout all or a significant portion of its range, and a “threatened species” as a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether a species meets the definition of endangered species or threatened species because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence.

Status Throughout All of Its Range

We examined the following threats to the cactus ferruginous pygmy-owl: climate change and climate condition (Factor E), habitat loss and fragmentation (Factor A), human activities and disturbance (Factor B and Factor E), human-caused mortality (Factor B and Factor E), disease and predation (Factor C), and small population size (Factor E), and we determined that the primary threats to the subspecies are climate change and climate condition, and habitat loss and fragmentation. Existing regulatory mechanisms (Factor D) and conservation efforts do not address the threats to the cactus ferruginous pygmy-owl to the extent that listing the subspecies is not warranted.

Population resiliency is highly variable across the range of the pygmy-owl. Overall, three analysis units maintain a moderate level of resiliency, with western Mexico maintaining a high level of resiliency and Arizona with a low level of resiliency. Therefore, the majority of the analysis units we examined maintain some ability to withstand stochastic events. Additionally, the western Mexico and northeastern Mexico analysis units are estimated to have a magnitude of abundance of tens of thousands of pygmy-owls. Due to the broad geographic distribution and network of population groups that are connected within and between some analysis units throughout most of its range, the pygmy-owl has some ability to recolonize following catastrophic events and is considered to have adequate redundancy. The cactus ferruginous pygmy-owl currently has high genetic and ecological variability across the range. This ecological diversity provides the subspecies with sufficient representation and may allow the pygmy-owl to adapt to, and survive, future environmental change if this representation can be maintained.

After evaluating threats to the subspecies and assessing the cumulative effect of the threats under the Act's section 4(a)(1) factors, we conclude that the risk factors acting on the cactus ferruginous pygmy-owl and its habitat, either singly or in combination, are not of sufficient imminence, intensity, or magnitude to indicate that the subspecies is in danger of extinction now (an endangered species) throughout all of its range. Despite current stressors, the subspecies currently maintains adequate resiliency, redundancy, and representation across the range such that the subspecies is currently able to withstand stochastic and catastrophic events and maintain adequate genetic and ecological variation throughout its range. However, our analysis of the cactus ferruginous pygmy-owl's future conditions shows that the threats to the subspecies are likely to continue and, in some cases and areas, increase into the future, resulting in continued loss and fragmentation of habitat and a reduction in abundance, putting the subspecies at risk of extinction within

the foreseeable future. We selected 30 years for the scope of our analysis in the foreseeable future because it captures multiple generations of pygmy-owls as well as stochastic variation in climate. Additionally, 30 years was the maximum time frame for which we could reasonably project certain land-use changes, urbanization, and climate patterns relative to the pygmy-owl and its habitat.

Under all future scenarios, we project a continued reduction in species viability throughout the range of the subspecies due to climate change (Factor E), habitat loss, and habitat fragmentation (Factor A). In 30 years, even under our most optimistic scenario, the reduced effects scenario, no analysis units will be in high condition, three will be in moderate condition, and two will be in low condition, a decrease from current conditions where one population is in low condition, three are in moderate condition, and one is in high condition. Over the next 30 years, many of the analysis units will become increasingly vulnerable to extirpation through the degradation of habitat conditions. We anticipate that urbanization and development (Factor A) will continue under all future scenarios and in all analysis units. Invasive species (Factor A) will continue to spread into pygmy-owl habitat in most analysis units and deforestation and wood harvesting will continue in all three analysis units in Mexico. Continued loss and degradation of pygmy-owl habitat (Factor A) will reduce overall species resiliency, impeding the ability of the subspecies to withstand stochastic events and increasing the risk of extirpation following such events. The loss of population groups will lead to a reduction in representation, reducing the subspecies' ability to adapt over time to changes in the environment, such as climate change.

The magnitude of current pygmy-owl abundance in three of the five analysis units is low to moderate, and while the remaining two analysis units have current pygmy-owl population estimates that are an order of magnitude higher (tens of thousands), these estimates do not represent actual pygmy-owl numbers and our analysis of future

scenarios indicates that these estimates will all decline with an associated decline in the abundance and distribution of pygmy-owl population groups. This expected reduction in both the number and distribution of sufficiently resilient population groups will reduce redundancy and impede the ability of the subspecies to recolonize following catastrophic disturbance. Thus, after assessing the best available information, we conclude that the cactus ferruginous pygmy-owl is not currently in danger of extinction but is likely to become in danger of extinction within the foreseeable future throughout all of its range.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. The court in *Center for Biological Diversity v. Everson*, 435 F. Supp. 3d 69 (D.D.C. 2020) (*Everson*), vacated the aspect of the Final Policy on Interpretation of the Phrase “Significant Portion of Its Range” in the Endangered Species Act’s Definitions of “Endangered Species” and “Threatened Species” (Final Policy; 79 FR 37578, July 1, 2014) that provided that the Service does not undertake an analysis of significant portions of a species’ range if the species warrants listing as threatened throughout all of its range. Therefore, we proceed to evaluating whether the species is endangered in a significant portion of its range—that is, whether there is any portion of the species’ range for which both (1) the portion is significant; and (2) the species is in danger of extinction in that portion. Depending on the case, it might be more efficient for us to address the “significance” question or the “status” question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species’ range.

Following the court’s holding in *Everson*, we now consider whether there are any

significant portions of the species' range where the species is in danger of extinction now (i.e., endangered). In undertaking this analysis for cactus ferruginous pygmy-owl, we choose to address the status question first—we consider information pertaining to the geographic distribution of both the species and the threats that the species faces to identify any portions of the range where the species may be endangered.

We evaluated the range of the cactus ferruginous pygmy-owl to determine if the species is in danger of extinction now in any portion of its range. The range of a species can theoretically be divided into portions in an infinite number of ways. We focused our analysis on portions of the species' range that may meet the definition of an endangered species. For the cactus ferruginous pygmy-owl, we considered whether the threats or their effects on the species are greater in any biologically meaningful portion of the species' range than in other portions such that the species is in danger of extinction now in that portion.

The statutory difference between an endangered species and a threatened species is the time frame in which the species becomes in danger of extinction; an endangered species is in danger of extinction now while a threatened species is not in danger of extinction now but is likely to become so in the foreseeable future. Thus, we reviewed the best scientific and commercial data available regarding the imminence of threats that are driving the cactus ferruginous pygmy-owl to warrant listing as a threatened species throughout all of its range. We then considered whether these threats or their effects are occurring in any portion of the species' range such that the species is in danger of extinction now in that portion of its range. We examined the following threats: climate change and climate condition (Factor E) and habitat loss and fragmentation (Factor A), including cumulative effects.

We found a concentration of threats, i.e., the impacts of climate change (Factor E), urbanization (Factor A), and invasive species (Factor A), in the Sonoran Desert

Ecoregion, which extends from Arizona south into Sonora, Mexico. Climate change impacts to the pygmy-owl in the Sonoran Desert Ecoregion are likely to include loss of vegetation cover, reduced prey availability, increased predation, reduced nest site availability, and vegetation community change. For example, models predict that the distribution of suitable habitat for saguaros, the primary pygmy-owl nesting substrate within the Sonoran Desert Ecoregion, will substantially decrease over the next 50 years under a moderate climate change scenario (Weiss and Overpeck 2005, p. 2074; Thomas et al. 2012, p. 43).

Climate models project that, by the end of the 21st century, the Sonoran Desert will experience an increase in drought conditions with a transition to a drier and more arid climate (Seager et al. 2007, p. 9; Cook et al. 2015, p. 6; Pascale et al. 2017, p. 806; Williams et al. 2020, p. 317). Given that this portion of the pygmy-owl's overall range is already characterized by arid and hot conditions and is in the midst of an extended drought (NDMC 2022, unpaginated), the effects from climate change represent a higher concentration of effects than in other portions of the pygmy-owl's range, which generally are characterized by higher precipitation and lower temperatures resulting in a baseline of higher greenness and vegetation health. In general, annual precipitation in the Sonoran Desert is positively correlated to pygmy-owl productivity (Flesch et al. 2015, p. 26). Timing and quantity of precipitation affects lizard and rodent abundance in ways that suggest rainfall is an important driver of prey population and community dynamics. In general, cool-season rainfall is positively correlated with rodent populations and warm-season rainfall is positively correlated with lizard populations. Projected increases in variability and decreases in quantity of precipitation will likely lead to a decrease in prey abundance for the pygmy-owl (Jones 1981, p. 111; Flesch 2008, p. 5; Flesch et al. 2015, p. 26).

Urban expansion and human population growth trends are expected to continue in the Sonoran Desert Ecoregion. Between 2010 and 2022, Arizona experienced some of the highest population increases in the US (U.S. Census Bureau 2021b, unpaginated). Border counties in Arizona are projected to increase by 60 percent to 2.5 million by 2050 (OEO 2018, unpaginated). The Maricopa-Pima-Pinal County areas of Arizona are expected to see the population grow by as much as 132 percent between 2005 and 2050, creating rural-urban edge effects across thousands of acres of pygmy-owl habitat (AECOM 2011, p. 13).

Development in Mexico is focused along the border and this area of northern Mexico has faster population growth than other Mexican states (Pineiro 2001, pp. 1–2). In Sonora, the population is projected to reach 3.5 million by 2030 (CONAPO 2014, p. 25). This development focuses potential barriers or impediments to pygmy-owl movements in a region that is important for demographic support (immigration events and gene flow) of pygmy-owl population groups, including movements such as dispersal. If urban expansion and development continues as expected, it will encompass a substantial portion of the current distribution of the pygmy-owl in the Sonoran Desert Ecoregion.

The invasion of nonnative vegetation, particularly nonnative grasses, has altered the natural fire regime over the Sonoran Desert Ecoregion portion of the pygmy-owl's range. Buffelgrass is prevalent and increasing throughout much of this portion of the pygmy-owl's range, leading to increased fire frequency in a system that is not adapted to fire (Schmid and Rogers 1988, p. 442; D'Antonio and Vitousek 1992, p. 73; Burquez and Quintana 1994, p. 23; Halverson and Guertin 2003, p. 13; Van Devender and Dimmit 2006, p. 5; Wied et al. 2020, pp. 47–48). While a single fire in an area may or may not produce long-term reductions in plant cover or biomass, repeated wildfires in a given area are capable of ecosystem type-conversion from native desertscrub to nonnative annual

grassland. These repeated fires may render the area unsuitable for pygmy-owls and other native wildlife due to the loss of trees and columnar cacti, and reduced diversity of cover and prey species (Brooks and Esque 2002, p. 336; Lyons et al. 2013, entire).

Despite the current concentration of threats and their increasing effects to pygmy-owls and pygmy-owl habitat, the Sonoran Desert Ecoregion currently supports an abundance of pygmy-owls in the high hundreds and a moderate amount of intact, suitable vegetation. Consequently, these factors are currently maintaining an overall moderate level of resiliency in this portion of the range. Additionally, there is currently habitat connectivity with evidence of pygmy-owl movement among population groups, providing redundancy throughout the Sonoran Desert Ecoregion. Representation is also currently being maintained through pygmy-owl occupancy of a variety of vegetation types throughout the Sonoran Desert Ecoregion with gene flow among these population groups. However, under all three future scenarios, this portion of the range is expected to become less resilient due to continued habitat fragmentation and the effects of climate change on habitat conditions, resulting in a reduction of pygmy-owl abundance and occupancy. These deteriorating conditions are also anticipated to result in declines in redundancy and representation through the loss of population groups within the ecoregion.

Although some threats to the cactus ferruginous pygmy-owl are concentrated in the Sonoran Desert Ecoregion, the best scientific and commercial data available do not indicate that the concentration of threats, or the subspecies' responses to the concentration of threats, results in the subspecies currently being in danger of extinction in that portion of its range. Given that pygmy-owls in the Sonoran Desert Ecoregion are maintaining populations in the high hundreds and the region currently supports moderate levels of intact, suitable vegetation, the subspecies is not currently in danger of extinction there. Therefore, the threats concentrated in the Sonoran Desert Ecoregion are such that

pygmy-owls in this portion of the range are not currently in danger of extinction (endangered) but are likely to become endangered in the foreseeable future (threatened), and hence have the same status as the pygmy-owl throughout all of its range. This does not conflict with the courts' holdings in *Desert Survivors v. U.S. Department of the Interior*, 321 F. Supp. 3d 1011, 1070-74 (N.D. Cal. 2018) and *Center for Biological Diversity v. Jewell*, 248 F. Supp. 3d 946, 959 (D. Ariz. 2017) because, in reaching this conclusion, we did not apply the aspects of the Final Policy, including the definition of "significant" that those court decisions held to be invalid.

Because the Arizona analysis unit is the only analysis unit currently in a low resiliency condition, we concluded that the subspecies' current biological status in this portion of the range may differ from the subspecies' biological status rangewide, and therefore evaluated whether this portion may be significant. Arizona is not ecologically significant because it contains the same habitat type as northern Sonora. Arizona is also not significant in size or importance to the species as a whole because it constitutes a very small portion of the species' range, comprising only 12 percent of the range, and containing a small proportion of the total number of pygmy-owls. Therefore, we do not find that the Arizona analysis unit does not constitute a significant portion of the range of the pygmy-owl.

Distinct Vertebrate Population Segment

Under the Service's Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act (61 FR 4722, February 7, 1996), three elements are considered in the decision concerning the establishment and classification of a possible DPS. These are applied similarly for additions to or removal from the Federal List of Endangered and Threatened Wildlife. These elements include:

- (1) The discreteness of a population segment in relation to the remainder of the species to which it belongs;

(2) The significance of the population segment to the species to which it belongs; and

(3) The population segment's conservation status in relation to the Act's standards for listing, delisting, or reclassification (i.e., is the population segment, when treated as if it were a species, endangered or threatened?).

Discreteness

Under the DPS policy, a population segment of a vertebrate taxon may be considered discrete if it satisfies either one of these conditions:

(1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.

(2) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

Significance

If a population segment is considered discrete under one or more of the conditions described in the Service's DPS policy, its biological and ecological significance will be considered in light of Congressional guidance that the authority to list DPSs be used "sparingly" while encouraging the conservation of genetic diversity. In making this determination, we consider available scientific evidence of the discrete population segment's importance to the taxon to which it belongs. Since precise circumstances are likely to vary considerably from case to case, the DPS policy does not describe all the classes of information that might be used in determining the biological and ecological importance of a discrete population. However, the DPS policy describes four possible classes of information that provide evidence of a population segment's biological and

ecological importance to the taxon to which it belongs. As specified in the DPS policy (61 FR 4722, February 7, 1996), this consideration of the population segment's significance may include, but is not limited to, the following:

(1) Persistence of the discrete population segment in an ecological setting unusual or unique to the taxon;

(2) Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon;

(3) Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; or

(4) Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics. A population segment needs to satisfy only one of these conditions to be considered significant. Furthermore, other information may be used as appropriate to provide evidence for significance.

Analysis of Potential Distinct Population Segments

The petitioners requested that we consider two potential DPSs of the pygmy-owl for protection under the Act, a Sonoran Desert DPS and an Arizona DPS. We considered potential DPS configurations that were not included in the petition in our 2011 12-month finding. Our conclusions regarding those additional DPS configurations have not changed since our 2011 12-month finding based on the best available information; therefore, they are not discussed further here.

Potential Eastern Population DPS

In our 2011 finding (76 FR 61856), we found that the eastern population of the pygmy-owl was physically, genetically, and ecologically discrete from the remainder of the range. The eastern portion of the range represents approximately 32 percent of the range; thus, the physical loss of this geographic area would represent a significant gap in

the range of the taxon. Therefore, the eastern population is discrete and significant under our DPS policy. However, the best available information indicates this DPS has the same status as the remainder of the range. The eastern population maintains a high abundance in northwestern Mexico. The pygmy-owl is not in danger of extinction now in the eastern population but is likely to become so in the foreseeable future, thus the eastern population has the same status as the subspecies throughout its range.

Potential Western Populations DPS

In our 2011 finding (76 FR 61856), we also found that the western population of the pygmy-owl was physically, genetically, and ecologically discrete from the remainder of the range. The western portion of the range represents approximately 68 percent of the range; thus, the physical loss of this geographic area would represent a significant gap in the range of the taxon. Therefore, the western population is discrete and significant under our DPS policy. However, the best available information indicates this DPS has the same status as the remainder of the range. The western population of the pygmy-owl maintains the highest abundance of pygmy-owls throughout the range. The pygmy-owl is not in danger of extinction now in the western population but is likely to become so in the foreseeable future, thus this population has the same status as the subspecies throughout its range. The DPS policy, published on February 7, 1996 (61 FR 4722), is intended for cases where only a segment of a vertebrate species' range needs the protections of the Act, rather than the entire range of a species, or when segments of a vertebrate species range differ in status between endangered and threatened. Although the eastern and western pygmy-owl DPSs are disjunct and somewhat geographically isolated from one another, they include the entire distribution of the pygmy-owl and the status of the species is the same for both DPSs and the subspecies overall. In accordance with the DPS policy, our authority to list DPSs is to be exercised sparingly. Thus, listing of the entire subspecies is appropriate in this case.

Potential Sonoran Desert DPS

None of the boundaries of the petitioner's Sonoran Desert DPS include an international border or boundary (CBD and DOW 2007, pp. 4–6). Therefore, the petitioned DPS must meet the first condition for discreteness in order to be considered a valid DPS, because it does not meet the second condition. As discussed in detail in our 2011 12-month finding (76 FR 61856, October 5, 2011), there are no obvious physical, geographic, ecological, or genetic barriers that separate the petitioned Sonoran Desert DPS from the rest of the pygmy-owl's range to the south. Additional genetic information we have received since our 2011 12-month finding has continued to show genetic connectivity between the petitioned Sonoran Desert DPS and the rest of the pygmy-owl's population to the south and that genetic differentiation amongst pygmy-owls sampled results from isolation by distance, rather than geographic isolation (Cobbold et al. 2022b, entire).

The Sonoran Desert Ecoregion may differ ecologically from the remainder of the areas within its range. However, the best available scientific and commercial data do not indicate that this ecological difference has resulted in any morphological, physiological, or genetic differentiation within pygmy-owl populations in the Sonoran Desert that would indicate a marked separation from other populations of pygmy-owls (Proudfoot et al. 2006a, entire; 2006b, entire; Cobbold et al. 2022b, entire).

Environmental characteristics within the Sonoran Desert have likely resulted in the reduced abundance and densities of pygmy-owls found in this area (Abbate et al. 1999, entire; Abbate et al. 2000, entire; Flesch 2003, pp. 36–92), and these reductions continue (Flesch et al. 2017, entire; Cobbold et al. 2021, entire). However, this situation does not appear to have resulted in any physical differentiation, at least as anecdotally observed, from adjacent pygmy-owl populations. We find that there is no evidence that the Sonoran Desert population of pygmy-owl is markedly separated in any way from the

remainder of the taxon. Therefore, we determine, based on a review of the best available information, that the petitioned Sonoran Desert DPS of the pygmy-owl does not meet the discreteness conditions of the 1996 DPS policy. As such, this population segment does not qualify as a DPS under our policy and is not a listable entity under the Act. The DPS policy indicates that significance should be analyzed only if a population segment has been identified as discrete. Because we found that the Sonoran Desert population segment did not meet the discreteness element and, therefore, does not qualify as a DPS under the Service's DPS policy, we did not conduct an evaluation of significance.

Additionally, as discussed in *Status Throughout a Significant Portion of Its Range*, above, this portion of the range is not in danger of extinction now, but likely to become so in the foreseeable future and therefore has the same status as the rest of the range.

Potential Arizona DPS

Because we are evaluating this petitioned entity based on the currently accepted taxonomic classification of the pygmy-owl, the taxon considered in this finding is the same as for our 1997 listing of the pygmy-owl (62 FR 10730, March 10, 1997).

Consequently, the petitioned Arizona DPS is exactly the same DPS configuration that was the subject of litigation and, ultimately, the same DPS configuration that the Service removed from the Federal List of Endangered and Threatened Wildlife in 2006 (71 FR 19452, April 14, 2006). That final rule presents our analysis showing that, while the discreteness criteria for the DPS were met, we concluded that this DPS was significant to the taxon as a whole. Our analysis in the final rule to delist the pygmy-owl showed that the then-listed Arizona DPS of the pygmy-owl was not markedly different in its genetic characteristics from pygmy-owls in northern Sonora, Mexico, and did not occur in a unique ecological setting; nor would loss of the DPS result in a significant gap in the range of the taxon. None of the scientific information compiled since the delisting alters the conclusions made in that final rule. Therefore, we determine, based on a review of the

best available information, that the petitioned Arizona DPS of the pygmy-owl does not meet the significance conditions of the 1996 DPS policy. Therefore, this population segment does not qualify as a DPS under our policy and is not a listable entity under the Act.

Determination of Status

Our review of the best scientific and commercial data available indicates that the cactus ferruginous pygmy-owl meets the definition of a threatened species. Therefore, we are listing the cactus ferruginous pygmy-owl as a threatened species throughout its range in accordance with sections 3(20) and 4(a)(1) of the Act.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened species under the Act include recognition as a listed species, planning and implementation of recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and conservation by Federal, State, Tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies and the prohibitions against certain activities are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Section 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

Recovery planning consists of preparing draft and final recovery plans, beginning with the development of a recovery outline and making it available to the public within 30 days of a final listing determination. The recovery outline guides the immediate implementation of urgent recovery actions and describes the process to be used to develop a recovery plan. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery plan also identifies recovery criteria for review of when a species may be ready for reclassification from endangered to threatened (“downlisting”) or removal from protected status (“delisting”) and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) are often established to develop recovery plans. When completed, the recovery outline, draft recovery plan, and the final recovery plan for the cactus ferruginous pygmy-owl will be available on our website (<https://www.fws.gov/program/endangered-species>), or from our Arizona Ecological Services Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g., restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands.

Once a species is listed, funding for recovery actions become available from a variety of sources, including Federal budgets, State programs, and cost-share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the States of Arizona and Texas will be eligible for Federal funds to implement management actions that promote the protection or recovery of the cactus ferruginous pygmy-owl. Information on our grant programs that are available to aid species recovery can be found at:

<https://www.fws.gov/service/financial-assistance>.

Section 8(a) of the Act (16 U.S.C. 1537(a)) authorizes the provision of limited financial assistance for the development and management of programs that the Secretary of the Interior determines to be necessary or useful for the conservation of endangered or threatened species in foreign countries. Sections 8(b) and 8(c) of the Act (16 U.S.C. 1537(b) and (c)) authorize the Secretary to encourage conservation programs for foreign listed species, and to provide assistance for such programs, in the form of personnel and the training of personnel.

Please let us know if you are interested in participating in recovery efforts for the cactus ferruginous pygmy-owl. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is listed as an endangered or threatened species and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of any endangered or

threatened species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us.

Federal agency actions within the species' habitat that may require conference or consultation or both as described in the preceding paragraph include management and any other landscape-altering activities on Federal lands administered by the Department of the Interior's U.S. Fish and Wildlife Service, Bureau of Land Management, and National Park Service (Organ Pipe Cactus National Monument and Ironwood Forest National Monument); the Department of Defense's Barry M. Goldwater Air Force Range and the U.S. Army Corps of Engineers (for issuance of section 404 Clean Water permits); the U.S. Department of Agriculture's U.S. Forest Service, Natural Resources Conservation Service, and Farm Service Agency; and construction and maintenance of roads or highways by the Federal Highway Administration.

It is our policy, as published in the *Federal Register* on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed, those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a final listing on proposed and ongoing activities within the range of a listed species. The discussion below regarding protective regulations under section 4(d) of the Act complies with our policy.

II. Final Rule Issued Under Section 4(d) of the Act

Background

Section 4(d) of the Act contains two sentences. The first sentence states that the Secretary shall issue such regulations as she deems necessary and advisable to provide for the conservation of species listed as threatened species. The U.S. Supreme Court has noted that statutory language like "necessary and advisable" demonstrates a large degree of deference to the agency (see *Webster v. Doe*, 486 U.S. 592 (1988)). Conservation is

defined in the Act to mean the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Additionally, the second sentence of section 4(d) of the Act states that the Secretary may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1), in the case of fish or wildlife, or section 9(a)(2), in the case of plants. Thus, the combination of the two sentences of section 4(d) provides the Secretary with wide latitude of discretion to select and promulgate appropriate regulations tailored to the specific conservation needs of the threatened species. The second sentence grants particularly broad discretion to the Service when adopting one or more of the prohibitions under section 9.

The courts have recognized the extent of the Secretary's discretion under this standard to develop rules that are appropriate for the conservation of a species. For example, courts have upheld rules developed under section 4(d) as a valid exercise of agency authority where they prohibited take of threatened wildlife or include a limited taking prohibition (see *Alsea Valley Alliance v. Lautenbacher*, 2007 U.S. Dist. Lexis 60203 (D. Or. 2007); *Washington Environmental Council v. National Marine Fisheries Service*, 2002 U.S. Dist. Lexis 5432 (W.D. Wash. 2002)). Courts have also upheld 4(d) rules that do not address all of the threats a species faces (see *State of Louisiana v. Verity*, 853 F.2d 322 (5th Cir. 1988)). As noted in the legislative history when the Act was initially enacted, "once an animal is on the threatened list, the Secretary has an almost infinite number of options available to [her] with regard to the permitted activities for those species. [She] may, for example, permit taking, but not importation of such species, or [she] may choose to forbid both taking and importation but allow the transportation of such species" (H.R. Rep. No. 412, 93rd Cong., 1st Sess. 1973).

Exercising this authority under section 4(d), we have developed a final rule that is designed to address the cactus ferruginous pygmy-owl's specific threats and conservation

needs. Although the statute does not require us to make a “necessary and advisable” finding with respect to the adoption of specific prohibitions under section 9, we find that this final rule as a whole satisfies the requirement in section 4(d) of the Act to issue regulations deemed necessary and advisable to provide for the conservation of the cactus ferruginous pygmy-owl. The provisions of this 4(d) rule will promote conservation of the cactus ferruginous pygmy-owl by encouraging survey and monitoring to increase our understanding of the abundance and distribution of pygmy-owls, by facilitating habitat restoration and enhancement projects that will benefit the cactus ferruginous pygmy-owl, and by increasing public awareness and support for the conservation of the pygmy-owl. The provisions of this rule are one of many tools that we will use to promote the conservation of the cactus ferruginous pygmy-owl.

As mentioned previously in **Available Conservation Measures**, section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species.

If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of actions that are subject to the section 7 consultation process are actions on State, Tribal, local, or private lands that require a Federal permit (such as a permit from the U.S. Army Corps of Engineers under section 404 of the Clean Water Act (33 U.S.C. 1251 et seq.) or a permit from the Service under section 10 of the Act (such as permits associated with habitat conservation plans or safe harbor agreements) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat—and actions on State, Tribal, local, or private

lands that are not federally funded, authorized, or carried out by a Federal agency—do not require section 7 consultation.

This obligation does not change in any way for a threatened species with a species-specific 4(d) rule. Actions that result in a determination by a Federal agency of “not likely to adversely affect” continue to require the Service’s written concurrence and actions that are “likely to adversely affect” a species require formal consultation and the formulation of a biological opinion.

Provisions of the 4(d) Rule

As discussed previously in **Summary of Biological Status and Threats**, we have concluded that the cactus ferruginous pygmy-owl is likely to become in danger of extinction within the foreseeable future primarily due to habitat loss and fragmentation (Factor A) and climate change and climate conditions (Factor E).

The protective regulations for the pygmy-owl incorporate all prohibitions from section 9(a)(1) of the Act, codified at 50 CFR 17.21, that apply to endangered species. Putting these prohibitions in place will help to prevent further declines in cactus ferruginous pygmy-owl populations, preserve the subspecies’ remaining populations and habitat, and reduce the negative effects from other ongoing or future threats. This 4(d) rule will provide for the conservation of the cactus ferruginous pygmy-owl by prohibiting the following activities, except as otherwise authorized or permitted: importing or exporting; take; possession and other acts with unlawfully taken specimens; delivering, receiving, transporting, or shipping in interstate or foreign commerce in the course of commercial activity; or selling or offering for sale in interstate or foreign commerce.

Under the Act, “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Some of these provisions have been further defined in regulations at 50 CFR 17.3. Take can result knowingly or otherwise, by direct and indirect impacts, intentionally or incidentally.

Exceptions to the prohibition on take include all of the general exceptions to the prohibition against take of endangered wildlife as set forth in 50 CFR 17.21 and certain other specific activities that we propose for exception, as described below. Therefore, we prohibit take of the cactus ferruginous pygmy-owl, except for take resulting from those actions and activities specifically excepted by the 4(d) rule.

The 4(d) rule provides for the conservation of the subspecies by allowing exceptions that incentivize conservation actions or that, while they may have some minimal level of take of the cactus ferruginous pygmy-owl, are not expected to rise to the level that would have a negative impact (i.e., would have only de minimis impacts) on the subspecies' conservation. In our proposed rule to list the pygmy-owl as threatened and its associated 4(d) rule, we considered a number of activities that could potentially be appropriate for our consideration in the 4(d) rule, including the need for compatibly managed grazing activities that result in the vegetation structure and composition needed to support the cactus ferruginous pygmy-owl.

Livestock grazing is not inherently detrimental to the cactus ferruginous pygmy-owl, provided that grazing management results in a plant community with species and structural diversity suitable for the species. Therefore, during the public comment period, we encouraged public comments on the issue of properly managed grazing and the best approach to address livestock grazing and management with the tools available. Based on the comments we received, and our analysis in the proposed listing rule, we determined that proper grazing management best occurs on the local level, and thus broad determinations within this rule would not be beneficial to the subspecies or local land managers. We considered promoting conservation of the cactus ferruginous pygmy-owl in the 4(d) rule by encouraging management of vegetation communities in ways that support both long-term viability of livestock enterprises and concurrent conservation of pygmy-owls. However, we determined that other mechanisms under our authorities, such

as section 7 consultations for grazing permits with a Federal nexus, would be more appropriate to support conservation benefits than provisions in this 4(d) rule. Therefore, livestock grazing is not excepted under this rule.

As discussed above under **Summary of Biological Status and Threats**, ongoing climate change, particularly increases in drought conditions, and habitat loss and fragmentation are affecting the status of the cactus ferruginous pygmy-owl. Education and outreach related to cactus ferruginous pygmy-owl recovery, specific survey and monitoring activities, and habitat restoration and habitat enhancement projects have the potential to benefit the cactus ferruginous pygmy-owl and mitigate some of these threats. Accordingly, this 4(d) rule addresses activities to facilitate conservation and management of the cactus ferruginous pygmy-owl where the activities currently occur and may occur in the future by excepting the activities from the Act's take prohibition under certain specific conditions. The exceptions to take prohibitions included in this 4(d) rule are education and outreach, specific survey and monitoring activities, and habitat restoration and enhancement (described below) that are expected to have negligible impacts to the cactus ferruginous pygmy-owl and its habitat and will benefit the conservation of the pygmy-owl. These activities are intended to improve our understanding of the abundance and distribution of pygmy-owls, increase management flexibility, and encourage support for conservation of, and habitat restoration or enhancement for, the cactus ferruginous pygmy-owl.

Education and Outreach

Education and outreach are a vital part of cactus ferruginous pygmy-owl recovery and progress towards achieving and maintaining population viability of cactus ferruginous pygmy-owls. This 4(d) rule excepts from take prohibitions those cactus ferruginous pygmy-owl education and outreach activities that use live pygmy-owls, or parts, and are undertaken for the purposes of increasing public awareness of cactus

ferruginous pygmy-owl biology, ecology, or recovery needs, as well as of the positive effects of having pygmy-owls as a viable part of the local ecosystems on the local society, economy, and quality of life for communities. Such educational activities may include use of educational captive-reared cactus ferruginous pygmy-owls, pygmy-owl skins, parts of pygmy-owls, as well as zoological exhibition. For such activities, raptors are typically covered by a permit issued under 50 CFR part 21, which governs species protected under the MBTA. To remove redundant permitting, this 4(d) rule will cover incidental take resulting from educational and outreach activities, including zoological exhibition, provided the researcher already holds an appropriate and valid MBTA permit issued under 50 CFR part 21. These activities can increase public awareness, engagement, and support for cactus ferruginous pygmy-owl conservation and recovery.

Education and outreach activities must be coordinated with the Service prior to commencing those activities. Coordination should occur no later than 60 calendar days prior to the initiation of the proposed activity, and this coordination can occur by contacting the Service's Arizona Ecological Services office. Coordination can occur in person, by phone, or through written communications. Written documentation of coordination with the Service should be maintained by the project proponent for education and outreach activities. Education and outreach activities covered by this 4(d) rule would have to be consistent with an existing designated recovery program, such as a recovery outline, final recovery plan, or recovery implementation schedule, and benefit cactus ferruginous pygmy-owl conservation through increased public awareness and engagement, which supports cactus ferruginous pygmy-owl recovery. Education and outreach qualifying under this exception (activities undertaken by those already possessing an MBTA permit as described above) would not require a permit issued under section 10(a) of the Act.

Specific Survey and Monitoring Activities

In our proposed rule, we asked the public and State agencies to provide comments on using the State permitting process, if required, in this 4(d) rule as the basis for an exception to the prohibitions on take for certain pygmy-owl surveying and monitoring activities. We consider surveying and monitoring activities necessary to understand and implement cactus ferruginous pygmy-owl conservation and recovery. We lack data on the current abundance, density, and distribution of the cactus ferruginous pygmy-owl across its geographic range in both the United States and Mexico. We also lack comprehensive data on the productivity, survival, mortality, and other natural history characteristics of the cactus ferruginous pygmy-owl. Such data have been gathered historically, but only in localized areas and primarily only in the United States and northern Sonora. Where we have data on occurrence, abundance, density, and natural history variables, it allows us to better understand the status of the cactus ferruginous pygmy-owl and what actions are necessary to conserve population groups and enhance status and viability. However, surveying and monitoring activities can result in short-term negative effects to cactus ferruginous pygmy-owls and, potentially, the take of individuals and nest sites. Take in the form of harm, such as disturbance, could potentially occur as a result of surveying and monitoring, but would be very unlikely if conducted following the approved protocol. We do not anticipate the direct fatality of any pygmy-owls as a result of these excepted activities. We conclude that any potential indirect take resulting from these activities will be inconsequential to the conservation and recovery of the pygmy-owl.

We want to encourage more comprehensive and widespread surveying and monitoring activities across the geographic range of the cactus ferruginous pygmy-owl because of the benefit to pygmy-owl conservation. Such benefits include the ability to direct conservation activities to those areas where they can be most effective, assessing the success of conservation activities, avoiding impacts to occupied areas, and identifying and understanding the effects of threats to pygmy-owls and their habitat. We have

determined that the benefits gained by implementing surveying and monitoring activities that do not require handling of pygmy-owls and use only call playback and visual observation methods, and that are being used to implement scientific studies or regulatory compliance to gain needed data for appropriated conservation and recovery of the pygmy-owl, outweigh the potential, short-term impacts to pygmy-owls.

In response to comments received by the State wildlife agencies of Arizona and Texas, we held follow up discussions with both State agencies. From these discussions, we determined that the existing permitting program in Arizona is conducive to supporting our inclusion of an exception to the take prohibitions under a 4(d) rule for certain surveying and monitoring activities covered by the AGFD permitting process. The TPWD issues permits only for activities that require handling of the animal. Thus, their permitting process is not conducive to an exception to the take prohibitions related to surveying and monitoring as we described them in the proposed listing rule and associated 4(d) rule (call playback and visual monitoring). Consequently, the exceptions for certain surveying and monitoring activities under this 4(d) rule apply only to activities in the State of Arizona.

This exception recognizes AGFD's authority to issue a permit to conduct call broadcast surveys and monitoring and nest monitoring for listed species. This State permitting would ensure oversight for surveyor and monitor qualifications, as well as data submission to the State agency. The AGFD permitting process will ensure that the impacts of the excepted activities are avoided or minimized. The Service will access this data through the AGFD's Heritage Data Management System for use within Service programs. Thus, an exception to the prohibitions of take is granted under this 4(d) rule if the surveyors and monitors possessed a valid AGFD scientific activity license that authorizes the appropriate survey and monitoring activities. The excepted survey and monitoring activities include broadcast call surveys using conspecific calls following the

approved Service pygmy-owl survey protocol (available in early 2023), visual monitoring that does not occur at a nest site, and visual monitoring at nest sites if included on the AGFD scientific activity license. This exception would not cover any activities that involve the handling of pygmy-owls. The surveying and monitoring activities excepted under this 4(d) rule must be associated with a legitimate scientific project or regulatory compliance activity. Call playback methods for recreational use are not excepted under this 4(d) rule and are subject to section 9 take prohibitions under the Act. In Arizona, a Federal section 10(a)(1)(A) permit is not required for the excepted surveying and monitoring activities described above. In Texas, these activities would require a Federal section 10(a)(1)(A) permit.

Because research that involves the capture, handling, marking, humane care, tissue sample collection, etc., of pygmy-owls may result in the direct take of cactus ferruginous pygmy-owls, we have determined that Federal oversight of these activities being conducted on this federally protected species are best administered through our section 10 permitting process (under the Act's section 10(a)(1)(A)). This permitting process allows us to assess the appropriateness of the proposed research projects and activities with regard to promoting the conservation of a listed species; evaluate the proposed research activities in relation to the requirements of the Act; reduce the potential for redundancy of effort and overlapping effects to cactus ferruginous pygmy-owls; and facilitate the opportunity to receive, analyze, and incorporate the most current information into conservation and recovery actions.

Habitat Restoration and Enhancement

Incidental take resulting from habitat restoration or enhancement projects within the geographic range of the pygmy-owl that improve the viability of cactus ferruginous pygmy-owl populations and population groups, and have been coordinated and approved by the Service, is excepted from the take prohibitions under this section 4(d) rule. Habitat

restoration and enhancement projects are needed to increase nest site (cavity) availability; improve habitat connectivity among cactus ferruginous pygmy-owl population groups; increase prey availability; improve vegetation structure and health and overall ecosystem health and sustainability within the range of the pygmy-owl; and decrease nonnative species, watershed degradation and erosion, and habitat loss or reduction due to extreme weather events and wildfire.

In order to be excepted from take prohibitions, the results of such actions must not rise to the level that would have a negative impact (i.e., would have only de minimis impacts) on the species' conservation. Although activities such as roadside vegetation management and removing trees for fuels management may indirectly benefit pygmy-owls or pygmy-owl habitat through the reduction of fires, these activities are highly dependent upon site- and project-specific conditions and have the potential to cause significant negative effects on pygmy-owls and their habitats. A broad exception under a section 4(d) rule for such activities cannot account for these project-specific conditions that would need to be considered to minimize any potential negative effects on the pygmy-owl. Similarly, though activities already covered under existing safe harbor agreements for other listed species may provide conservation benefits to the pygmy-owl, a broad exception to such actions would prevent consideration of any effects on the pygmy-owl and its habitat. Therefore, the take exceptions under this 4(d) rule do not apply to roadway vegetation management, fuels management, safe harbor agreement activities for other species, or other activities as described below that involve removal of trees, large shrubs, and other woody vegetation.

This 4(d) rule excepts from take prohibitions those habitat restoration or enhancement activities that have improving cactus ferruginous pygmy-owl habitat conditions as their primary purpose or that directly improve or benefit pygmy-owl habitat conditions (even if the purpose of the activity is not to restore or enhance pygmy-owl

habitat) across the subspecies' geographical range. Specific habitat restoration or enhancement actions that improve pygmy-owl habitat conditions include the following: nest box installation; establishment or protection of nesting substrates (large trees or columnar cacti) to increase the availability of nest cavities; restoration or enhancement of native vegetation structure and species; control or eradication of invasive, nonnative species; riparian enhancement or restoration; water developments; watershed improvements; improved habitat connectivity; and fire management.

Prescribed fire within Sonoran Desert vegetation communities is not excepted under this 4(d) rule. Fire can be an effective tool in maintaining ecosystem health, which is beneficial to the cactus ferruginous pygmy-owl. However, Sonoran Desert vegetation communities are not fire-adapted, and the use of fire in these vegetation communities must be carefully implemented or important pygmy-owl habitat elements can be lost or altered. Therefore, because of the risks associated with the loss or alteration of pygmy-owl habitat, the use of fire in Sonoran Desert vegetation communities is not excepted from the take prohibitions under this 4(d) rule. We acknowledge that some areas cannot discretely be identified as Sonoran Desert vegetation, such as transition areas from grassland valleys to bajadas that support Sonoran Desert vegetation. In these transition areas, prescribed fire can be an important tool to maintain ecosystem health and viability. Therefore, during the coordination and approval process with the Service (described below), these transition areas can be discussed, and a determination made as to the appropriateness and benefit of prescribed burning in these areas and whether it is appropriate to except the project under this 4(d) rule. Criteria that will be considered include the objective of the prescribed burn, presence of saguaros (either mature or young age classes), presence of tree species that are not fire adapted, the size and vegetation composition of drainages within the prescribed burn area, season of burn, and anticipated severity of the burn.

Woody vegetation communities provide the most important pygmy-owl habitat factors, particularly woodland tree canopy cover. Projects and actions that remove woody vegetation or woodland tree cover would typically reduce the quality of habitat for pygmy-owls. Such actions may reduce vegetation structure and cover diversity, pygmy-owl prey diversity, and important predator avoidance and thermoregulatory cover for the pygmy-owl. Therefore, any action that would result in more than a minimal reduction or removal of tree cover (as determined during the coordination with the Service described below), including along roadways or for fuels management, is not excepted from take under the 4(d) rule. The extent of woody vegetation or tree removal that occurs during the implementation of projects that can be excepted under this 4(d) rule will generally be determined during project-specific coordination. However, as an example of the level of removal that the Service may consider as minimal, we have historically used a level of between 20 percent and 30 percent reduction in tree cover as maintaining habitat values for the pygmy-owl. Typically, in order to be excepted under this 4(d) rule, projects or activities will not have woody vegetation removal as the primary objective of the action.

We acknowledge that woody vegetation invasion within certain vegetation communities, such as native grassland communities, can be detrimental to the health and viability of those communities. A healthy, functioning ecosystem that can support listed species is one of the primary objectives of the Act. In these cases, management of woody vegetation can improve the health and function of these vegetation communities and would benefit pygmy-owl conservation. If the objective of a vegetation management activity (including brush management or mesquite control) is to improve ecosystem health, function, and sustainability, we can coordinate with project proponents to determine if the specifics of the vegetation management project will allow the project to be excepted from take under this 4(d) rule (see information below on coordination and approval for activities included in this 4(d) rule). Criteria that will be considered when

reviewing habitat restoration projects may include the objective of the vegetation management activity, presence of saguaros (either mature or young age classes), proximity to and the type of drainages within the proposed activity area and the inclusion of protection measures to avoid and protect trees and other riparian vegetation along drainages, and the methods of vegetation control to be used.

Actions that promote the use of, or encourage the growth of, nonnative vegetation species are not excepted in the 4(d) rule. Nonnative vegetation species can outcompete and replace native species that provide important habitat factors for the pygmy-owl. This outcome is particularly true when nonnative species form monocultures, resulting in low diversity and dense ground cover that alters natural fire regimes and reduces pygmy-owl prey diversity and availability. Conversely, activities related to the management and control of nonnative, invasive species have a direct benefit to pygmy-owls through the reduction of competition, promotion of native species and biodiversity, enhancement of prey species, and the maintenance of natural fire regimes. Therefore, activities related to the management, control, or removal of nonnative, invasive species may fall under the habitat restoration and enhancement exception of this 4(d) rule, if coordination with the Service occurs as described for habitat restoration and enhancement activities in this 4(d) rule and those activities are implemented in a way that avoids tree removal, avoids impacts to nest substrates (columnar cacti and large trees), uses low-impact treatment methods, and considers seasonal disturbance issues (minimizes impacts during nesting and dispersal seasons).

During the public comment period, we received a request to include development activities in the 4(d) rule. Although we acknowledge the potential benefits of providing specific guidance for landowners relating to development activities, the unique settings and circumstances in which these projects occur limit our ability to develop broad guidance applicable to all projects across the range of the pygmy-owl. Furthermore,

development, and subsequent habitat loss and fragmentation, are major threats to the pygmy-owl and its habitat. Therefore, development activities are not excepted under this 4(d) rule.

In order to fall under the activities included under the habitat restoration or enhancement take exception in the 4(d) rule, persons implementing cactus ferruginous pygmy-owl habitat enhancement and restoration activities must coordinate with the Service prior to commencing work and receive approval. If there is doubt about whether or not a project or activity would be excepted under this 4(d) rule, please contact the Service's Arizona Ecological Services Field Office. Coordination should occur no later than 60 calendar days before the desired start date of the proposed activity and can occur by contacting that office. Coordination can occur in person, by phone, or through written communications. Written documentation of coordination with the Service should be maintained by the project proponent for the habitat restoration or enhancement activities. Prior to approving proposed activities, the Service will coordinate with the appropriate affected entities (land management agencies, Tribal entities, private landowners, etc.) and identify any concerns, but also opportunities for partnerships where proximate land managers can work together to effectively treat greater areas of pygmy-owl habitat.

For all forms of allowable take in the 4(d) rule, reasonable care will be practiced to minimize the impacts from those actions. Reasonable care means limiting the impacts to cactus ferruginous pygmy-owl individuals and populations by complying with all applicable Federal, State, and Tribal regulations for the activity in question; using methods and techniques that result in the least harm, injury, or death, as feasible; undertaking activities at the least impactful times (e.g., conducting activities that might impact nesting cactus ferruginous pygmy-owls or nesting habitat only after nesting is concluded for the year) and locations, as feasible; procuring and implementing technical assistance from a qualified biologist on projects regarding all methods prior to the

implementation of those methods; minimizing the number of individuals disturbed in the existing wild population; implementing best management practices to ensure no disease or parasites are introduced or spread in pygmy-owl populations, including the proper use of quarantine and health evaluations; and preserving the genetic diversity of wild populations.

Permitting and Other Regulations To Cover Take

Despite these prohibitions regarding threatened species, we may under certain circumstances issue permits to carry out one or more otherwise-prohibited activities, including those described above. The regulations that govern permits for threatened wildlife state that the Director may issue a permit authorizing any activity otherwise prohibited with regard to threatened species. These include permits issued for the following purposes: for scientific purposes, to enhance propagation or survival, for economic hardship, for incidental taking, or for special purposes consistent with the purposes of the Act (50 CFR 17.32). The statute also contains certain exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

We recognize the special and unique relationship with our State natural resource agency partners in contributing to conservation of listed species. State agencies often possess scientific data and valuable expertise on the status and distribution of endangered, threatened, and candidate species of wildlife and plants. State agencies, because of their authorities and their close working relationships with local governments and landowners, are in a unique position to assist us in implementing all aspects of the Act. In this regard, section 6 of the Act provides that we must cooperate to the maximum extent practicable with the States in carrying out programs authorized by the Act. Therefore, any qualified employee or agent of a State conservation agency that is a party to a cooperative agreement with the Service in accordance with section 6(c) of the Act, who is designated by his or her agency for such purposes, will be able to conduct

activities designed to conserve the cactus ferruginous pygmy-owl that may result in otherwise prohibited take without additional authorization.

Nothing in this 4(d) rule will change in any way the recovery planning provisions of section 4(f) of the Act, the consultation requirements under section 7 of the Act, or our ability to enter into partnerships for the management and protection of the cactus ferruginous pygmy-owl. However, interagency cooperation may be further streamlined through planned programmatic consultations for the species between us and other Federal agencies, where appropriate.

III. Critical Habitat

Background

Section 4(a)(3) of the Act and implementing regulations (50 CFR 424.12) require that we designate critical habitat at the time a species is determined to be an endangered or threatened species, to the maximum extent prudent and determinable. In the December 22, 2021 (86 FR 72547) proposed listing rule, we determined that designation of critical habitat was prudent but not determinable because specific information needed to analyze the impacts of designation was lacking. We are still in the process of assessing this information. We plan to publish a proposed rule to designate critical habitat for the cactus ferruginous pygmy-owl in the near future.

Required Determinations

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

Regulations adopted pursuant to section 4(a) of the Act are exempt from the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.) and do not require an environmental analysis under NEPA. We published a notice outlining our reasons for this determination in the *Federal Register* on October 25, 1983 (48 FR 49244). This includes listing, delisting, and reclassification rules, as well as critical habitat designations and species-specific protective regulations promulgated concurrently with a decision to list or

reclassify a species as threatened. The courts have upheld this position (*e.g.*, *Douglas County v. Babbitt*, 48 F.3d 1495 (9th Cir. 1995) (critical habitat); *Center for Biological Diversity v. U.S. Fish and Wildlife Service.*, 2005 WL 2000928 (N.D. Cal. Aug. 19, 2005) (concurrent 4(d) rule)).

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with federally recognized Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes.

We contacted the Ak Chin Indian Community, Apache Tribe of Oklahoma, Cocopah Indian Tribe, Comanche Nation, Gila River Indian Community, Hopi Tribe, Pascua Yaqui Tribe, San Carlos Apache Tribe, Salt River Pima-Maricopa Indian Community, Tohono O'odham Nation, Tonkawa Tribe of Indians, White Mountain Apache Tribe, Wichita and Affiliated Tribes, and Yavapai Apache Nation regarding the SSA process by mail and invited them to provide information and comments to inform the SSA. Our interactions with these Tribes are part of our government-to-government consultation with Tribes regarding the pygmy-owl and the Act. The Tohono O'odham Nation was invited to participate as a member of the SSA team because they have historically participated on issues related to the cactus ferruginous pygmy-owl and they

have extensive acreage of pygmy-owl habitat. They accepted the invitation and have participated in development of the SSA, as well as with pygmy-owl surveys and monitoring. We will continue to work with Tribal entities during the rulemaking process.

References Cited

A complete list of references cited in this rulemaking is available on the internet at <https://www.regulations.gov> in Docket No. FWS-R2-ES-2021-0098 and upon request from the Arizona Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this final rule are the staff members of the Fish and Wildlife Service's Species Assessment Team and the Arizona Ecological Services Field Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Plants, Reporting and recordkeeping requirements, Transportation, Wildlife.

Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

1. The authority citation for part 17 continues to read as follows:

AUTHORITY: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245, unless otherwise noted.

2. In § 17.11, amend paragraph (h) by adding an entry for “Pygmy-owl, cactus ferruginous” to the List of Endangered and Threatened Wildlife in alphabetical order under Birds to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Common name	Scientific name	Where listed	Status	Listing citations and applicable rules
* * * * *				
BIRDS				
* * * * *				
Pygmy-owl, cactus ferruginous	<i>Glaucidium brasilianum cactorum</i>	Wherever found	T	88 FR [<i>Federal Register</i> page where the document begins], [Date of publication in the <i>Federal Register</i>]; 50 CFR 17.41(1). ^{4d}
* * * * *				

3. Amend § 17.41 by adding paragraph (l) to read as follows:

§ 17.41 Special rules—birds.

* * * * *

(l) Cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*). (1)

Prohibitions. The following prohibitions that apply to endangered wildlife also apply to the cactus ferruginous pygmy-owl. Except as provided under paragraphs (l)(2) and (3) of this section and §§ 17.4, 17.5, and 17.7, it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit, or cause to be committed, any of the following acts in regard to this subspecies:

(i) Import or export, as set forth at § 17.21(b) for endangered wildlife.

(ii) Take, as set forth at § 17.21(c)(1) for endangered wildlife.

(iii) Possession and other acts with unlawfully taken specimens, as set forth at § 17.21(d)(1) for endangered wildlife.

(iv) Interstate or foreign commerce in the course of commercial activity, as set forth at § 17.21(e) for endangered wildlife.

(v) Sale or offer for sale, as set forth at § 17.21(f) for endangered wildlife.

(2) *General exceptions from prohibitions.* In regard to this subspecies, you may:

(i) Conduct activities as authorized by a permit under § 17.32.

(ii) Take, as set forth at § 17.21(c)(2) through (4) for endangered wildlife, and (c)(6) and (7) for endangered migratory birds.

(iii) Take as set forth at § 17.31(b).

(iv) Possess and engage in other acts with unlawfully taken wildlife, as set forth at § 17.21(d)(2) for endangered wildlife and (d)(3) and (4) for endangered migratory birds.

(3) *Exceptions from prohibitions for specific types of incidental take.* You may take cactus ferruginous pygmy-owl while carrying out the following legally conducted activities in accordance with this paragraph (1)(3):

(i) Educational and outreach activities that have been coordinated with the Service no later than 60 calendar days prior to the initiation of the proposed activity, provided the researcher already holds an appropriate, valid permit issued under part 21 of this chapter, which governs species protected under the Migratory Bird Treaty Act, for educational activities involving the use of live pygmy-owls, zoological exhibitions, pygmy-owl skins, or parts of pygmy-owls or other raptors.

(ii) Specific surveying and monitoring activities within the State of Arizona that do not include handling of pygmy-owls (e.g., call playback, visual observation, collection of feathers in nests or on the ground, and camera monitoring) and only if they are conducted under a valid scientific activity license issued by the Arizona Game and Fish Department.

(A) Data collected must be submitted to the Arizona Game and Fish Department for inclusion in their Heritage Data Management System.

(B) Call playback surveys and monitoring must follow the most current, Service-approved protocol.

(C) Surveying and monitoring activities must be associated with a legitimate scientific project or regulatory compliance activity.

(iii) Habitat restoration and enhancement activities and projects that are coordinated with and approved by the Service no later than 60 calendar days prior to the initiation of the proposed activity.

(A) These activities and projects may include activities that enhance cactus ferruginous pygmy-owl habitat conditions; improve ecosystem health and sustainability within the range of the pygmy-owl; improve habitat connectivity; increase availability of nest cavities; increase prey availability; reduce or control invasive, nonnative plant species; and enhance native plant communities, particularly woodland riparian communities.

(B) These activities and projects do not include prescribed fire within Sonoran Desert vegetation communities (unless these activities and projects occur in vegetation community transition areas and are coordinated with and approved by the Service), actions that would result in more than a minimal reduction or removal of tree cover (as determined through coordination with and approved by the Service and generally involving no more than a 30 percent reduction in tree cover) such as fuels management or roadway vegetation management, land development, or actions that use or promote nonnative vegetation species.

(iv) For all forms of allowable take, reasonable care must be practiced to minimize the impacts from the actions. Reasonable care means:

(A) Limiting the impacts to cactus ferruginous pygmy-owl individuals and populations by complying with all applicable Federal, State, and Tribal regulations for the activity in question;

(B) Using methods and techniques that result in the least harm, injury, or death, as feasible;

(C) Undertaking activities when and where they have the least impact (e.g., conducting activities that might impact nesting cactus ferruginous pygmy-owls or nesting habitat only after nesting is concluded for the year), as feasible;

(D) Procuring and implementing technical assistance from a qualified biologist on all methods and techniques used for a project prior to their implementation;

(E) Minimizing the number of individual pygmy-owls disturbed in the existing wild population;

(F) Implementing best management practices to ensure no diseases or parasites are introduced into existing cactus ferruginous pygmy-owl populations; and

(G) Preserving the genetic diversity of wild populations.

* * * * *

Martha Williams,
Director,
U.S. Fish and Wildlife Service.

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